is considered low. The primary reasons for this assessment are: (1) a detailed erosion and sedimentation control plan has been prepared and submitted, which complies with the Connecticut Department of Energy and Environmental Protection's (CTDEEP's) 2002 *Connecticut Guidelines for Erosion and Sediment Control*; and (2) the dominant soils (i.e., Canton and Charlton soil series) in the areas to be graded and/or exposed have low to moderate erodibility (i.e., K-Factor 0.17 to 0.37; whole soil).

However, Wetland Unit A3, the Generating Facility Site's large central wetland is considered a somewhat sensitive resource, especially in the early portion of the growing season when there is flow in its watercourse and, therefore, diligent control maintenance and monitoring is necessary to ensure this resource is protected during the construction phase. This maintenance and monitoring will be required per the Stormwater Pollution Prevention Plan (SWPPP) (provided separately).

In addition to the traditional silt fence/haybale barriers, the SWPPP calls for the use of wood chip berms as yet another barrier to any fine sediment that may pass through the silt fence mesh and haybales. Properly sized and placed, these can be very effective in removing fines, even down to the colloidal fraction. As an extra precaution, in addition to the above perimeter barriers, "silt socks" will be utilized, as necessary, in certain areas, based on conditions encountered in the field during construction. These are 12-inch to 18-inch tubes filled with compost (minimum 2-year) that are placed downgradient of the primary barrier(s) and upgradient of the wetlands at the site.

In order to reduce unnecessary encroachment towards the wetlands at the Generating Facility Site, fill slopes greater than 3:1 are proposed facing Wetland Units A1/A2, and A3. Per the *Connecticut Guidelines for Soil Erosion and Sediment Control* (CTDEEP 2002), erosion control blankets are required for permanent stabilization. Before these blankets are applied, the graded slopes will be seeded with an appropriate seed mix, including the New England Roadside Matrix Upland Seed Mix (NEWP, Inc.), which includes grasses, legumes, and shrubs such as staghorn sumac (*Rhus typhina*), silky dogwood (*Cornus amomum*), and grey dogwood (*C. racemosa*). The intent of using the erosion control blankets and the specialized seed mixes is dual: (1) to provide robust and permanent stabilization of the fill slopes; and (2) to provide a very low maintenance vegetative cover type to complement upland habitat left undisturbed next to wetland resources (i.e., buffer zones; see also Section 4.2.2).

4.2.2 Removal of Native Vegetation and Habitat Loss

Habitat loss associated with land clearing, if not properly mitigated, has the potential of impacting wetlands and watercourses. At the Generating Facility Site, most of the habitat to be cleared and converted to pervious or impervious surfaces consists of areas that are wooded – mostly mixed deciduous/evergreen – and moderately sloping. Forest adjacent to wetlands not only provides protection during the construction phase, but also can contribute positively to their functions and values (e.g., wildlife habitat). Therefore, an effort was made through the planning process to minimize disturbance (i.e., earthwork, tree clearing) within 50 feet of Wetland Units A1, A2, and A3, to the extent practicable, and to also provide a wider setback to hard surfaces (i.e., pavement, buildings, structures).

Wetland Unit A3, the KEC Site's larger central wetland, was found to be somewhat higher functioning than the other wetland resources, and somewhat more sensitive with regard to its hydrology. Therefore, efforts to provide a substantial post-construction "wetland buffer zone" or "setback" are prioritized here. As can be seen from the submitted plans, the limit of disturbance is farther back than 50 feet in all cases, except in one relatively small section in the far southwestern portion of the wetland, where a vegetated fill slope would encroach an average of 38 feet within this zone (minimum is 20 feet). However, the average width of this undisturbed zone to Wetland Unit A3 from any proposed grading is roughly 80 feet. Moreover, the average distance from the edge of pavement to Wetland Unit A3 is over 190 feet.[4]

By heavily planting both the detention basin and the fill slope, which alone adds nearly 50 feet of additional *horizontal* separation from the wetland, the effective buffer zone is at least 100 feet in width for Wetland Unit A3. Moreover, the fill slope adds roughly 28 to 30 feet of *vertical* separation to the wetlands. This means that potential visual and auditory impacts to wetland-associated and wetland-dependent wildlife will be minimized by being well elevated and away from wetlands.

The proposed buffer zones to Wetland Units A1 (the man-made pond) and A2 are less than those for Wetland Unit A3, but only for the upper southernmost section. Again, approximately 200 feet below the pond, the undisturbed buffer zone will be more than

[4] Representative distances for the undisturbed wetland buffer and the wetland setback to "hard" surfaces are included in the submitted plan set.

50 feet, and over 100 feet taking the fill slope into account. The elevation of activities at the facility nearly 30 feet above the wetlands will also ameliorate long-term indirect impacts.

Based on this analysis, the proposed wetland buffer zones and setbacks are sufficient to protect wetland functions and values in the post-construction phase.

4.2.3 Potential Impacts to Wetland Hydrology and Stream Flow

The hydrologic and flow regimes of the Generating Facility Site's wetlands, and particularly those of Wetland Unit A3, are dependent to a great extent on contributions by shallow groundwater discharge originating in the land to be developed for the electric generating facility.

A great deal of site design and mitigation has focused on ensuring that wetland hydrology is maintained post-construction. For an analysis and discussion of this potential impact, refer to Section 4.2.5, which concludes that the groundwater recharge/discharge function of Wetland Unit A3 would not be adversely altered. Thus, wetland hydrology and stream flows would be maintained, post-construction.

4.2.4 Potential Water uality Impacts

Stormwater runoff from impervious surfaces of industrial sites, if not properly managed, has the potential of degrading the water quality (i.e., surface and groundwater) of regulated resources. As a first step, two surface water sampling sessions at the Generating Facility Site's man-made pond (Wetland Unit A1), and the two seasonal streams associated with Wetland Units A2 and A3 were conducted. The first sampling session took place in March 2016, during "dry" weather, while the second was in May 2016, during a precipitation event.[5] The collected samples were tested for a variety of constituents including nutrients at a Connecticut-certified laboratory (Phoenix Environmental Laboratories, Inc.).[6] The results show that surface

[5] Sampling was conducted at the tail end of a precipitation event totaling +/- 0.95 inches.
[6] Note that REMA does not filter samples in the field for ortho-phosphate. While this procedure of filtering out particulates might be necessary for some applications, it is not necessary for baseline natural resource surveys. Inclusion of particulates would only raise the value for ortho-phosphate. This, however, was not the case at KEC site. The values were just above or near the detection limit, denoting excellent water quality.

waters at the Generating Facility Site are not polluted, and meet the State water quality standards for Class A surface waters. This was fully expected for the site's headwater streams, based on visual observations. These results form a baseline for the site that could be used to compare with any post-construction monitoring.

Generation of potential pollutants on impervious surfaces typically results from vehicular traffic over them. The more the "axle-miles" or the movements of vehicles over impervious surfaces, the higher is the loading of runoff constituents, including sediment, nutrients, and heavy metals. Even though the proposed facility is considered industrial, vehicular traffic over impervious surfaces during day to day operations is considered of low intensity. Therefore, generation of potential pollutants would also be low for this site.

The CTDEEP's 2004 *Stormwater uality Manual* (the Manual) is used to guide the selection, design, siting, and sizing of appropriate BMPs, which are protective of surface and groundwater quality. The CTDEEP has adopted, through its General Permit for discharge of stormwater, an average annual 80% total suspended solids (TSS) minimum removal goal, because research has shown that the concomitant removal of other runoff constituents is high at these levels of TSS removal. Nevertheless, the designer of the appropriate BMPs must also be cognizant of the fact that attenuation of the soluble fraction of many runoff constituents, for example nutrients and metals, are not easily removed with sediment, to which many pollutants adsorb. With this in view, above-ground, vegetated water quality basins are necessary for the treatment of runoff, to maximize physical, chemical, and biological attenuation processes, and attenuate soluble constituents to a high degree.

For the Generating Facility Site, which has the most intense use, the proposed post-construction SMS design treats generated runoff in two different ways, depending on the type of surface materials. The bulk of the facility will consist of pervious surfaces (i.e., crushed stone) allowing precipitation and the bulk of the roof runoff to infiltrate directly into crushed stone surfaces, during all but the most intense of rainstorm events. Roof runoff is considered much cleaner than what is typically generated on impervious surfaces, and will be polished as it filters through the crushed stone layer and the underlying pervious substrata.

The full analytical results can be found in Attachment D: Surface Water Quality Sampling, of the *Wetland Report: Existing Conditions* (June 2016).

Only about 6.5 acres of impervious surfaces, mostly for the access driveway and the ring road around the perimeter of the facility, will generate runoff and be treated by a formal system.[7] This consists of a multi-element treatment train with the following components and practices:[8] (1) routine pavement sweeping and catch basin cleanouts; (2) deep sump catch basins with hooded outlets; (3) a hydrodynamic separator; (4) a large sediment forebay; (5) a stormwater wetland; (6) a bioretention basin, and (7) a large level spreader. Should the system discharge via the roughly 140-foot long level-spreader,[9] treated runoff would travel as overland flow for about 60 feet to the downgradient wetland resources, allowing for further polishing. Even then, the seasonal watercourse, which would be considered the more sensitive resource, is at least another 50 feet away.

In accordance with the Manual, the water quality volume (WQV) was conservatively calculated for the formal stormwater management system, as if runoff from all 6.5 acres of impervious surfaces, including roofs, were to be conveyed through the system. This is the volume of water generated as runoff during the 1-inch water quality storm. The calculation shows that the detention basin (i.e., forebay, stormwater wetland, bioretention basin) far exceeds the needed WQV.[10]

To aid in the design and to predict the performance of the Generating Facility Site's currently proposed BMPs, several regional reference studies (e.g., UNH-SC 2012)[11] were reviewed to determine expected percent removal of TSS for the site's SMS system, in view of the receiving surface waters (i.e., wetlands and watercourses). Using best professional judgment to find the closest match with regard to each of the SMS's BMPs (e.g., catch basins, hydrodynamic separator, bioretention basin, etc.), the expected average TSS removal efficiencies were estimated for the BMPs (see Table 1).

[7] An additional 0.637 acres of impervious surfaces within the containment area for the oil tank are "sealed off" from the drainage system during storm events. After a particular storm, and only after inspection, the collected water will be released to the drainage system.
[8] Refer to the Stormwater Pollution Prevention Plan (SWPPP) for more detailed information on periodic monitoring and maintenance of stormwater BMPs.
[9] Due to the capacity of the site's primary treatment system (i.e., sediment forebay, stormwater wetland, bioretention basin) to hold more than twice the required water quality volume (WQV), discharge from the system is not expected during most storm events. Treated runoff would be entirely infiltrated.
[10] Required WQV: 9,365 cubic feet; provided WQV: 20,800 cubic feet.
[11] University of New Hampshire Stormwater Center. 2012 Biennial Report.

The combined pollutant removal efficiency of BMPs in series can be evaluated using the equation:

$$E_T = [1 - (1 - E_1)(1 - E_2)(1 - E_3)(1 - E_4)] \text{ X } 100$$

Where: E_T = The total efficiency of BMPs in series
E_1 = Removal efficiency of BMP #1
E_2 = Removal efficiency of BMP #2
E_3 = Removal efficiency of BMP #3, etc.

Table 1: Estimated TSS Removal Efficiencies for Site's SMS

BMP	Removal Rate
Impervious Surfaces Sweeping[12]	10%
Catch Basins (with 4-foot deep sumps, snouts, and annual cleanout)	15%
Hydrodynamic Separator (with internal bypass)	75%
Bioretention Basin with sediment forebay and stormwater wetland pre-treatment	87%

$$E_T = [1-(1-0.10)(1-0.15)(1-0.75)(1-0.87)] \text{ X } 100 = \boldsymbol{97.51} \quad (\text{ otal SS Removal})$$

Based on the proposed BMP-rich treatment train and the analysis of proposed stormwater management at the Generating Facility Site, the water quality of the receiving waters will be maintained, and no degradation is expected.

4.2.5 Potential Impacts to Wetland Functions & Values

Introduction

The foundation for the following discussion of potential impacts to the functions and values of the wetlands at the KEC Site is the assessment of functions and values under *existing* conditions (see Section 3.0, above). This includes both a narrative summary and a comprehensive matrix of rationales for each of the 14 USACE functions and values (see Attachment C).

As previously mentioned, the four wetland evaluation units for the KEC site include the three headwaters riparian corridors (i.e., Wetland Units A1/A2, A3, and B) located on the Generating Facility Site, and Wetland Unit D at the Switchyard Site.

[12] Based on an annual sweeping schedule.

Groundwater Recharge/Discharge

Groundwater inputs to Wetland Units A1 and A2 from the hillside to the east will be undiminished, because the eastern portion of the Generating Facility Site will be left undisturbed. Based on our field observations over the course of six months a larger proportion of hillside seepage feeding the man-made pond and the wetlands originates at the upper eastern edge of the pond and the eastern edge of Wetland Unit A2, which is likely the reason why the spring/well house was originally built there (see also Photo 5). However, some seepage also flows into the pond (WA1) and the stream corridor (WA2) from the west and northwest, where extensive grading is proposed.

KEC lies to the east and south of the broad Wetland Unit A3 and its seasonal watercourse. Because the western watershed of WA3 is dominated by a steep bedrock-dominated ridge with minimal groundwater discharge, WA3 is even more dependent for this function on groundwater discharged from the area that would be mostly occupied by the proposed electric generating facility.

With maintenance of wetland hydrology being a primary goal of the development plan, only about 6.5 acres of the 24 acres of land to be disturbed at the Generating Facility Site would be *impervious* and be handled directly by a piped stormwater management system. Runoff from most of the roofs will be discharged to areas that are conducive to significant infiltration, particularly for the more frequent storms, that make up the bulk of rainfall on an annual basis.[13] Thus, rainfall will continue to infiltrate into the proposed crushed stone substrate within the remaining 17.5 acres, some draining easterly, via shallow groundwater flow, into Wetland Units A1 and A2, and the rest draining westerly into Wetland Unit A3.

In the absence of transpiring trees, a somewhat higher volume of infiltrated rainfall would reach the groundwater table post-development, than under existing conditions, per unit area, which will compensate for the capturing and diversion of runoff from *impervious* surfaces to the proposed stormwater basin. In addition, the last cell of the stormwater basin is a bioretention area which would allow renovated stormwater to infiltrate to the ground and supply groundwater to the nearby wetlands. In conclusion,

[13] In the region, approximately 90% of rainfall is associated with rainstorms of one inch or less. These storms contribute to baseflow conditions in the great majority of wetlands and streams.

this function would not be significantly or adversely impacted for Wetland Units A1/A2 and A3.

At the Switchyard Facility site, only 0.358 acres of impervious surfaces are proposed for the roughly 4 acre total land disturbance, and runoff will for the most part be directed as sheet flow to infiltrate to the ground. Groundwater recharge function will not be affected at Wetland Unit D.

No impacts to the groundwater discharge/recharge function are expected for Wetland B and the other smaller western wetlands, as work is not proposed within their watersheds.

Floodflow Alteration (Storage and Desynchronization)

This will continue to be a *principal* function for all three riparian corridors, post construction. *pportunity* may be marginally increased for the WA1/A2 corridor, but particularly for the WA3 corridor, because the roughly 24 acres of disturbance for the facility on the Generating Facility Site and the introduction of both pervious and impervious surfaces will reduce transpiration by trees and slightly increase runoff rates and runoff volumes, mostly during the higher frequency storms (i.e., 2-year and less). The volume of treated runoff that would be discharged to the central wetland (i.e., WA3) during a 2-year storm would increase, according to the SWPPP, from 1.19 acre-feet to 1.73 acre-feet. Realistically, this 45.3% percent increase can be easily handled by WA3 without any discernable impacts from the slight increase of the depth, duration, and extent of flooding. Additionally, since no direct filling of wetlands is proposed within the Generating Facility Site, there will be no reduction of flood storage capacity. This function is lacking in Wetland Unit D, the only wetland to be partially filled. Finally, there is no discharge of stormwater to Wetland Unit B, thus no alteration to its flood storage function.

Fish and Shellfish Habitat

This function is limited to the man-made pond (Wetland Unit A1), with a population of small mouth bass. Adverse impacts will be minimized by maintaining the existing pond-edge trees, for shade and leaf litter, and by rigorous erosion controls to prevent soil loss from the steep cut slopes: photodegradable, double–net straw/coconut erosion

control blankets. Comparable controls are also to be used on other steep slopes, upgradient Wetland Units A2 and A3. As the risk of sediment discharge is greatly minimized by the proposed measures, the headwater streams on the site will continue to support downgradient and off-site fisheries function, including that of the Quinebaug River (see Photos 6 and 7), with cool, unpolluted water.

The proposed stormwater basin will not have measurable thermal impacts on the site's seasonal outlet stream because the retained and infiltrated volume in a one-inch storm (prior to overflow) is more than double the required water quality volume (WQV),[14] and would be filtered through the media within the bioretention cell, prior to any discharge. Moreover, overheated runoff from roofs, etc. will not be released to the stream below, but be allowed to infiltrate within the site's crushed stone surfaces.

Sediment/Toxicant/Pathogen Retention

pportunity for this function may increase slightly post-construction if not properly mitigated. Some residual construction fine sediment may be present, but is not anticipated based on the proposed mitigation measures.

Potential for pollutant attenuation will remain unchanged, except for the direct losses of vegetation in Wetland Unit D. Naturally occurring sediment export from the site – which also takes place during existing conditions – will settle in the man-made pond and seasonally flooded pools within the wetlands, and be filtered by wetland vegetation. Over time they will be sequestered in soil, or biodegraded. Wetland Unit A3 has broad areas with organic soils and slow-flowing water, which function especially well to adsorb metals, hydrocarbons, and fine particulates, although based on our review of the stormwater management system, the risk of such an occurrence is *de minimis.* Each of the forested wetlands has the potential to provide this function, both through filtration of residual air pollution by foliage, and through uptake with soil water. Pollutant concentrations are projected to be so low that the wetland ecosystems will not be adversely impacted as they continue to provide this functional value.

[14] According to CT DEEP's Stormwater Quality Manual (2004) the Water Quality Volume (WQV) is defined as the runoff volume generated with a particular catchment during a one-inch rain event.

Nutrient Removal/Retention/Transformation

As with the previous function, *opportunity* may slightly increase during construction, and to a lesser extent afterwards, as some fine sediment that may reach the wetlands will continue to release nutrients for a growing season or slightly longer. This is the case at any construction site, because some of the phosphorus and nitrogen in soil are exported when soils are disturbed, regardless of the quality of erosion controls, but the risk is much less with the coarse loamy to sandy soils at this site. This is because larger soil particles are entrained less readily by runoff. The organic soil in the wetlands north of Lake Road (Generating Facility Site) will remain undisturbed. South of Lake Road (Switchyard Site), nutrient transport via soil will be minimal due to the lack of a watercourse and a direct discharge, as well as the level terrain.

Potential is high as has already been shown in the assessment of functions and values under existing conditions in a previous section of the report. Both the dense vegetation and the extent of saturated soils affect nutrient removal/denitrification potential. These characteristics are not expected to change in Wetland Units A1/A2, A3, and B *unless* the hydrology of these riparian corridors should become significantly altered, either directly due to reduced groundwater discharge or more flashy (greater amplitude in water depth fluctuation). As discussed above (groundwater discharge/recharge function), the design of the generating facility makes this highly unlikely.

Production Export

For this function, the processes related to the food web involve nutrient uptake by plants and filter feeders, transformation, cycling, and finally mineralization back to simple nutrients from complex organic compounds. The myriad players are plant and animal species in several guilds. The function is most stable if the wetland food web is complex, involving many species and links, as is the case at this site.

Food Web

Post-construction, food web complexity may be somewhat less, especially in the two corridors south of Lake Road and adjacent to the generating facility. This is because a subset of wildlife currently feeding on wetland insects, frogs, foliage and stream insects, bark borers, etc. are somewhat less tolerant of nearby developed land uses.

They are termed "fragmentation sensitive" or forest interior species. In particular, Louisiana waterthrush and veery (*Catharus fuscescens*) will likely no longer be cycling nutrients in these wetlands; other species such as gray catbird (*Dumetella carolinensis*), great crested flycatcher (*Myiarchus crinitus*), green frog (*Lithobates clamitans*), and downy woodpecker (*Picoides pubescens*) will remain or even increase in density, and continue this function. Wood frogs (*Lithobates sylvaticus*) migrating from breeding areas to the north and east will also continue to feed on invertebrates in wetland leaf litter, and salamander larvae will continue to eat mosquito larvae in Wetland Unit B, well buffered by forest both under existing and proposed conditions.

With the planned proper erosion control monitoring and maintenance, both streams will continue to support sensitive aquatic species at the base of the food chain, such as mayflies, caddisflies, and two-lined salamanders.

Detritus Export

One major category of the production export function relates to waterborne export of biomass from aquatic cover types via streams or pond outlets. Post-construction, leaf litter will continue to fall into the streams, where it will be shredded and then washed downstream toward the Quinebaug River during larger rain storms. Export from Wetland Unit A3 will continue to include dead foliage of emergent plants, like tussock sedge (*Carex. stricta*) and other assorted sedges and grasses.

Only an unlikely, major lapse in erosion and sedimentation controls could result in large sediment dams that interfere with detritus transport, and excessive nutrient loading that would trigger algal blooms. The latter would cause excessive undesirable fine-particulate detritus export.

REMA has recommended back-up measures to prevent export of fine sediment to the regulated resources. Where grading is close to wetlands (<50 feet) and/or where slopes are steep between the fence and the wetland, silt fence and haybale barriers can be backed up with wood chip or compost berms or silt socks (mesh stuffed with compost). Compost berms can be effective for 2.5 years (the life of the construction project); and are the most effective barrier for fine sediment: made of *well rotted* wood chips, about 16 inches high and two feet wide, placed immediately behind a well-trenched behind

silt fence. Socks or "logs" of mesh filled with compost, are also effective though more expensive and sometimes difficult to install after construction has commenced.

Nighttime llumination

In wetlands, a major food source for avians, bats, frogs, and larger arthropods is flying insects, which usually develop on plants, in streams, or in detritus. The intensity and design of nighttime lighting and fencing at the facility will influence the extent to which populations of night-flying insects are disrupted/reduced. KEC will incorporate lighting for safety purposes, designed for minimal off-site impact.

Sediment/Shoreline Stabilization

The proposed stormwater management system controls both the rates and volumes of stormwater runoff. Moreover, and the velocities of discharged waters are controlled through the use of 140-long level spreader so that they are not erosive. Therefore, this function will be maintained within the site's wetlands and seasonal watercourses.

Wildlife Habitat

Impacts to the wildlife function closely parallel impacts to the production export function, though the scope is broader. This is rated a *principal* function in each wetland, as a result of both habitat features, such as diversity of vegetation structure, and landscape setting. It will remain a principal function, but this function may be diminished as some species drop out, or use wetland habitats to a lesser extent. However, this would be balanced out by an increase is species diversity associated with edge habitat, particularly with edge habitat that is diffuse and not abrupt, as will be the case at the site.

As noted in the previous section, the bird species in each wetland vary in their tolerance of forest fragmentation and other related anthropogenic disturbances (vehicle and machinery noise, nighttime artificial lighting, daytime visual disturbance, etc.). Fortunately, a large group of avian species, common throughout the less remote portions of Connecticut does not require large, unfragmented blocks of habitat. Other species typically associated with wetlands, like the veery, are found in unfragmented forest, but also near human activities, so long as the overall surrounding landscape has

a high proportion of forest. However, the Louisiana waterthrush is a less common wetland-dependent species that may vacate Wetland Unit A3, post-construction. Particular habitat components, such as large diameter trees, may be key, as for the pileated woodpecker (*Dryocopus pileatus*), which contributes to wetland wildlife function, even though it is equally at home in uplands.

With fauna other than birds, such as northern two-lined salamanders (*Eurycea bislineata*), sensitive species are not excluded by fragmentation per se, but rather by the degradation of water quality and habitat that is often – but not necessarily – associated with fragmentation. KEC will have state-of-the-art and conservative BMPs to protect water quality and prevent erosion and sedimentation, both on-site and off-site.

Endangered Species Habitat

This function is potentially *present* in the wetlands of the Generating Facility Site, based on the detection of two "listed" wetland-dependent bats (i.e., little brown bat, silver-haired bat). However, since no direct wetland impacts are being proposed at the Generating Facility Site's wetlands, no change to this function is expected. The special concern broad-winged hawk, heard calling twice, on or near the site, is unlikely to be impacted since much unfragmented, high quality, forest will remain at or near the site.

Human Use Values

The marginal existing suitability of the site for *recreation* and *educational* experiences for the general public might be further curtailed at the site, except for those portions left undisturbed to the far north, including the prominent ridgeline. It is likely, however, that a serious scientific investigator would be granted access; the assurance that the general public would not interfere could be a benefit, so *educational scientific value* would continue to be *present* or even become a principal function. *esthetic* value would continue, but would no longer be a principal function. Various wetland criteria in the rationales list, such as absence of noise, will also no longer be present, reducing the human use values, even without the access issues.

The "*Uniqueness and Heritage" value,* with a long and strict set of criteria, was not determined to be present under existing conditions; nor will it be present after the proposed changes.

5.0 WETLAND MITIGATION

5.1 Introduction

As with every development proposal with direct wetland impacts, a hierarchical process is first followed. It begins with avoidance of impacts, then minimization, and finally, with compensatory mitigation. Once impacts have been avoided and/or minimized to the extent practicable, mitigation is proposed in the sequence of wetland restoration, enhancement, and creation.

For this development proposal, avoidance and minimization of impacts were explored within the confines of project objectives, which at Switchyard Site required a utility switchyard based on specific Eversource design requirements. Site constraints, such steep topography and cultural resources (i.e., family cemetery) also determined the location of the utility switchyard, which was positioned with the least direct wetland impact possible. It is this direct wetland impact of 12,500 square feet that a mitigation plan must address.

5.2 Wetland Replication

Since opportunities for wetland restoration, such as restoring a degraded and/or filled wetland, do not exist within the overall site, compensatory wetland mitigation in the form of wetland creation coupled with wetland enhancement is being proposed. A suitable site for wetland creation is the northeastern section of the Switchyard Site, currently an open field (see Photo 8).

The mitigation plan at the selected area was developed based on the soils, topography, hydrology, and existing habitat characteristics. The designed final vegetation classes for the wetland creation are wet meadow and emergent marsh with a native scrub-shrub transition zone. This would not only replace the vegetative cover types at the impact area, but would also complement the wetland habitats immediately off-site to the east within the Eversource electric transmission right-of-way.

Within a conservation easement of about 0.77 acres, the proposed created wetland area will be approximately 17,000 square feet in size (i.e., 0.39 acres). Presently the soils here are moderately well drained, with a seasonal high groundwater table at 21 to 28 inches below the ground surface. Grades are gentle (i.e., 3 to 4 percent), and the area is vegetated with grasses and forbs of moist habitats. Invasive plants are still limited here, but do include glossy buckthorn, multiflora rose (*Rosa multiflora*), and autumn olive. Therefore, topsoil free of invasives, such as screened forest topsoil from the Generating Facility Site, shall be used at the mitigation area, and be amended by mixing with high-quality compost (2-year minimum), to achieve a minimum organic matter content (by weight), of 10 percent.

Suitable wetland hydrology for the created wetland will be achieved through shallow excavation of 1 to 3 feet, and the area will be sculptured to provide moist to wet habits, and mircotopographical variation. The targeted hydrologic regimes shall be *seasonally saturated*, and *seasonally flooded*.

Selected native plants shall include species that provide flowers and berries during the beginning, middle, and end of the growing season, and also provide a variety of structural and growth habits (e.g., low to high shrubs, small trees, clonal spreaders, etc.). Additionally, both high quality seed mixes and emergent plant propagules have been selected, suitable for both moist and wet environments. The goal is to provide a floristic and structural diversity that is much higher than that of the wetland impact area.

Once implemented, and by the second growing season, the created wetland will function at a higher level than the wetland to be impacted, providing a higher vegetative diversity, a variety of hydrologic regimes, and numerous habitat elements (e.g., rotting logs, boards, microtopography, etc.). A detailed plan with implementation notes and planting materials tables will be prepared following the guidelines put forth by the USACE New England District. It will include monitoring provisions and reporting to federal, state, and local regulatory agencies.

5.3 Wetland Enhancement

Wetland enhancement in the form of invasive shrub/vine removal is being proposed both at the Generating Facility Site and at the Switchyard Site. Specifically, an area of approximately 35,000 square feet (minimum) is targeted at the Generating Facility Site, which includes the upper (i.e., southern) section of Wetland Unit A2, Wetland Unit X, the western shore of the man-made pond (i.e., Wetland Unit A1), and a swath of uplands immediately adjacent to these same wetlands (see submitted plans). At the Switchyard Site, approximately 18,000 square feet (minimum) of Wetland Unit D, and immediately adjacent on-site wetlands and uplands, are targeted for invasive shrub removal. Targeted invasive species at these areas include Asiatic bittersweet (*Celastrus orbiculatus*), Japanese barberry (*erberis thunbergii*), multiflora rose, and glossy buckthorn.

At the Generating Facility Site, Japanese barberry and multiflora rose are the primary targeted species (see Photo 9). These are locally dense, especially along the seasonal watercourse associated with Wetland Unit A2, but their overall density is not yet at a level of infestation. At Wetland Unit D, glossy buckthorn is the major invasive species, already forming dense monocultures, and Asiatic bittersweet is starting to appear (see Photo 10). Eradication of these specific species is necessary not only to enhance the portion of Wetland Unit D that is not to be directly impacted, but also to protect the adjacent proposed wetland replication area from this species. A multi-year invasive species control/eradication plan will be part of the submitted Wetland Replication Plan.

The invasive control methods to be used for invasive shrub control and eradication will be those that are promulgated by the CTDEEP and/or the Nature Conservancy. They will include a combination of mechanical and chemical protocols.

5.4 Post-Construction Invasives Control

Whenever new forest edges are created, such as upgradient and to the southeast of Wetland Unit A3, invasive species already in the seed bank, flourish. Some of these species are shade tolerant (e.g., Japanese barberry, winged euonymus [*Euonymus alatus*]), but typically invasive species encroachment extends 40 to 50 feet from the new edge. Therefore, an *nvasive Plant Control Plan* is proposed for the site that will

eradicate and control invasive species for a period of five years post-construction, within 50 feet of the new forest edge. Finally, a moderate size patch of Japanese knotweed (*Fallopia japonica*) was observed on the Switchyard Site, near the existing abandoned barn (see Photo 11). This is likely associated with direct runoff from Lake Road. During construction, this patch, and at least an additional 15 feet surrounding it, shall be excavated to a depth of 6 to 10 feet, depending on the results of an exploratory test pit, and be properly disposed of through burial or at a landfill. This is one of the highest priority invasives for removal in Connecticut, especially with regard to wetlands and riparian areas.

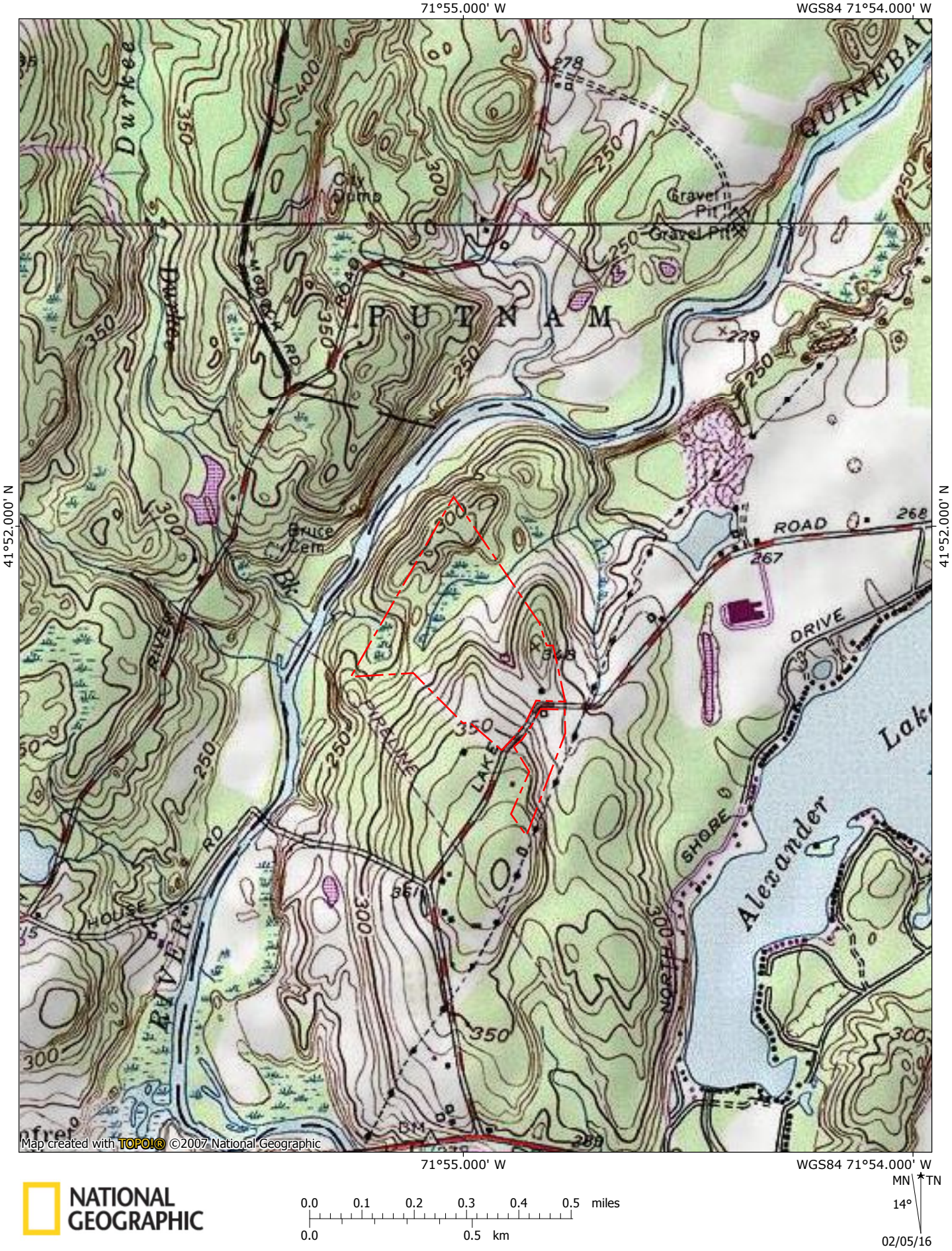
6.0 CONCLUSION

It is our professional opinion that the proposal represents the feasible and prudent alternative in regard to direct and indirect, short-term and long-term impacts to wetlands and watercourses. There will be no significant or adverse impacts to wetlands and watercourses, whether on-site or off-site, resulting from the proposed Killingly Energy Center.

Moreover, the proposed mitigation package, consisting of wetland habitat replication, enhancement, and preservation will more than off-set the proposed direct wetland impacts. The site's wetlands will continue to provide major functions and values in the post-construction phase, at very similar levels as under existing conditions.

ATTACHMENT A: Figures

FIGURE 1: Site Locus; Generating Facility and Switchyard Sites
Lake Road, Killingly, CT

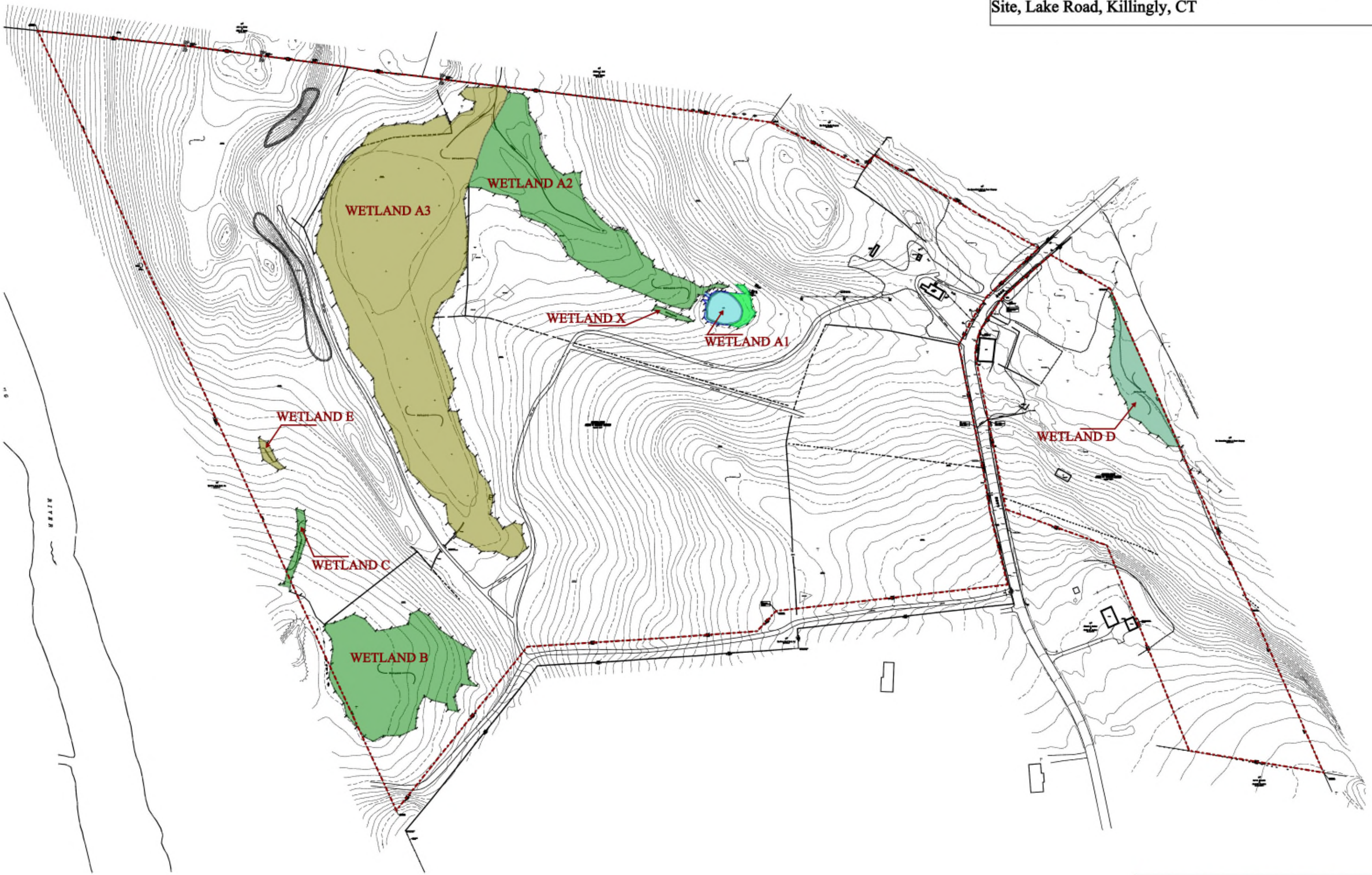


NATIONAL GEOGRAPHIC

0.0 0.1 0.2 0.3 0.4 0.5 miles
0.0 0.5 km

MN TN
14°
02/05/16

FIGURE 2: Wetland Units at the Killingly Energy Center Site, Lake Road, Killingly, CT



PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 6-16-16 ***SCALE***: NTS

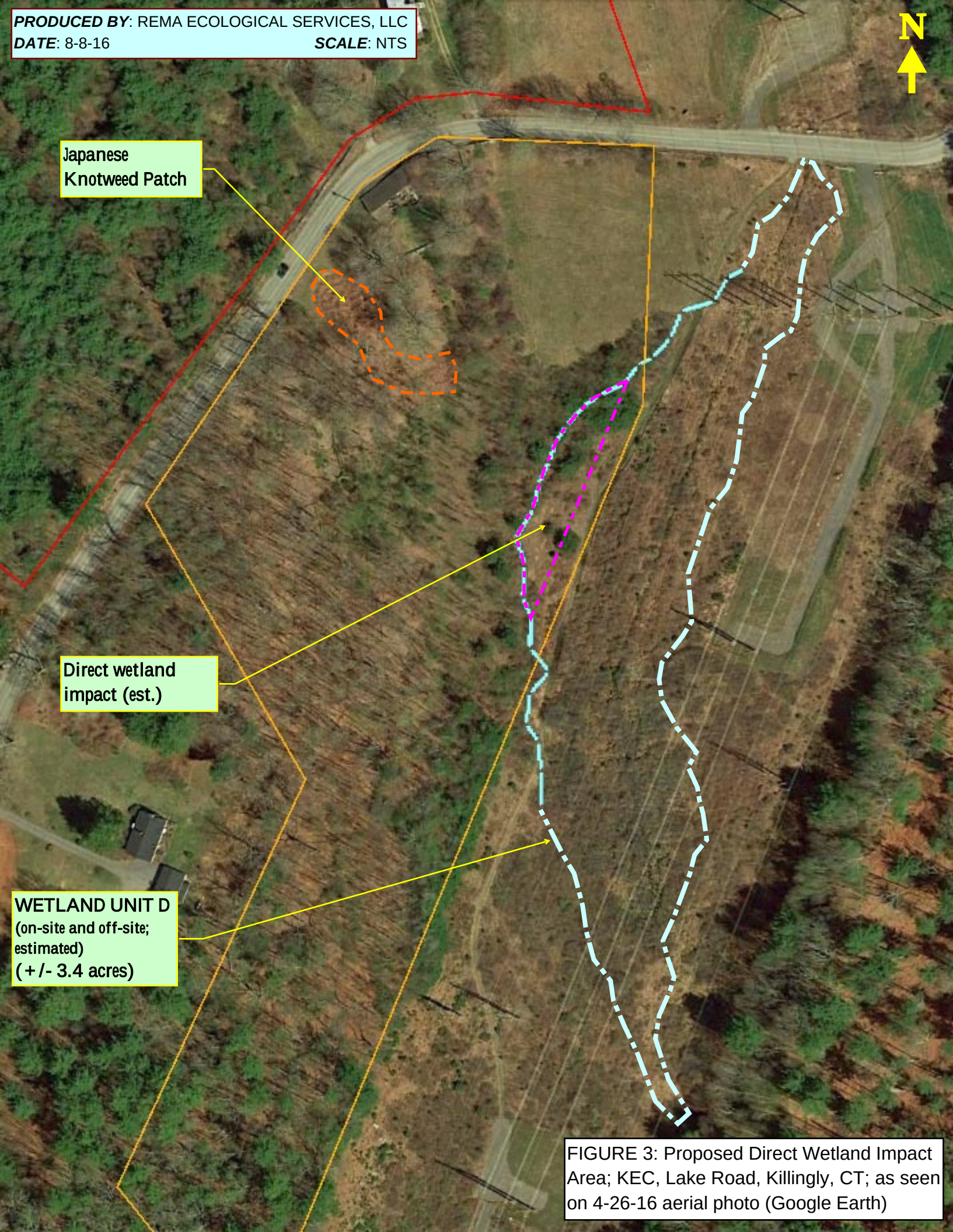


FIGURE 3: Proposed Direct Wetland Impact Area; KEC, Lake Road, Killingly, CT; as seen on 4-26-16 aerial photo (Google Earth)

ATTACHMENT B: Annotated Photographs

Wetland/Watercourse Resources associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo 1: Eversource electric ROW off-site to east of Switchyard Site; Wetland Unit D at far end of ROW; 7-21-16; facing northeasterly

Photo 2: Wetland Unit D (off-site); on-site portion barely visible on left of poles; 7-21-16; facing northeasterly

Photo 3: Wetland Impact Area (Wetland Unit D); emergent portion dominated by goldenrods and grasses; 7-21-16; facing northwesterly

Photo 4: Wetland Impact Area (Wetland Unit D); scrub shrub portion dominated by red maple, white pine, and glossy buckthorn; 7-21-16; facing southeasterly

Photo 5: Active seepage area adjacent to man-made pond during a moderate drought; 7-21-16; facing southerly

Photo 6: All of the site's wetlands drain towards the Quinebaug River; a few hundred feet northwest of site; facing northeasterly (upriver)

Photo 7: Quinebaug River west of site during moderate drought; 7-21-16; facing southwesterly (downriver)

Photo 8: Proposed Wetland Replication Area; moist meadow at northeasterly section of mowed field at Switchyard Site; 7-21-16; facing easterly

Photo 9: Japanese barberry to be removed along Wetland Unit A2 seasonal stream; 7-21-16; facing southerly (upstream)

Photo 10: Thicket of glossy buckthorn to be removed within Wetland Unit D at Switchyard Site; 7-21-16; facing northeasterly

Photo 11: Japanese knotweed, upper (western) section of patch to be removed at Switchyard Site; 4-13-16; facing easterly

ATTACHMENT C: Functions & Values Assessment: Rationales

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach

(US Army Corps of Engineers New England Division 1995)

Project: ***Killingly Energy Center, Killingly, Connecticut***

Summary of Wetland Characteristics *(from summary form)*

Wetlands A1, A2:	Excavated pond (A1) with overflow into intermittent stream bordered by forested wetland (A2)
Wetland A3:	Broad stream corridor with outwash soils draining via seasonal streeam towards Quinebaug River
Wetland B:	Forested hillside headwaters wetland with a vernal pool, draining to Quinebuag River via a seasonal stream
Wetland D:	Successional shrub swamp and wet meadow along utility corridor.

Total Area of wetland: *A1, A2: 2.23 acres A3: 6.26 acres B: 1.8 acres D: 0.51 acres*

Part of a wildlife Corridor ? A1, A2: *Yes* A3: *Yes* D: *Yes* Habitat Island? A1 A3: *No* B: *No D: No*

Adjacent Land use: A1, A2, A3: *Forest, single family residential;* *B: Forest, D: forest , road, and powerline*

Distance to nearest roadway/other development: *A1, A2: 200' A3: 500', B: 200', D: 300'*

Dominant Wetland Systems: *A1/A2: PFO1 A3: PFO1/3, PEM,R3UB1 B: PFO1/3, D: PSS1, PEM (See forms)*

Contiguous undeveloped buffer zone: *A1/A2: Yes A3: Yes B: Yes D: Yes*

Is the wetland a separate hydraulic system? A1/A2: *No A3: No B: No D: No*

If not, where does wetland lie in drainage basin? *A1/A2: upper A3: upper B: upper D: upper*

How many tributaries contribute to the wetland? *A1/A2: 1 A3: 1 B: 0* *(all: also small seepage rivulets)* *D: 0*

Wildlife and Vegetation Diversity and abundance: *(See report)*

Summary of Assessment Results *(rationales in following pages)*

		Wetland A1/A2	Wetland A3	Wetland B	Wetland D
1	GROUNDWATER RECHARGE/DISCHARGE	**P**	**P**	**P**	Y
2	FLOODFLOW ALTERATION (Storage & Desynchronization)	**P**	**P**	**P**	Y
3	FISH AND SHELLFISH HABITAT	Y	N	N	N
4	SEDIMENT/TOXICANT/PATHOGEN RETENTION	Y	Y	Y	Y
5	NUTRIENT REMOVAL/RETENTION/TRANSFORMATION	Y	Y	Y	Y
6	PRODUCTION EXPORT (Nutrient)	**P**	**P**	**P**	Y
7	SEDIMENT/SHORELINE STABILIZATION	Y	Y	Y	N
8	WILDLIFE HABITAT	**P**	**P**	**P**	**P**
9	RECREATION	Y	Y	N	Y
10	EDUCATIONAL/SCIENTIFIC VALUE	Y	Y	Y	Y
11	UNIQUENESS/HERITAGE	N	N	N	N
12	VISUAL QUALITY/AESTHETICS	**P**	**P**	Y	Y
13	ENDANGERED SPECIES HABITAT	Y	Y	Y	Y
14	FISH AND SHELLFISH HABITAT (Supporting marine resources)	N	N	N	N

Present? (Y/N) Principal? (P)

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach

Numbers correspond to numbers on ACOE Functional Values summary form.

GROUNDWATER RECHARGE/DISCHARGE

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
Y	Y	Y	N	1. Public or private wells occur downstream of the wetland.	*Along Quinebaug River*
Y	Y	Y	N	2. Potential exists for public or private wells downstream of the wetland.	
Y	Y	N	Y	3. Wetland is underlain by stratified drift.	*Lower part of A2, B, and D*
Y	Y	N	Y	4. Gravel or sandy soils present in/or adjacent to the wetland.	
Y	Y	Y	Y	5. Fragipan does not occur in the wetland.	
N	N	N	N	6. Fragipan, impervious soils, or bedrock, does occur in the wetland.	
Y	Y	Y	N	7. Wetland is associated with a perennial or intermittent watercourse.	
Y	Y	Y	Y	8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.	
Y	Y	Y	N	9. Wetland is associated with a watercourse, but lacks a defined outlet or contains a constricted outlet.	
Y	Y	Y	N	10. Wetland contains only an outlet.	*Rivulets flow from seeps into these headwaters streams*
Y	Y	Y	Y	11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.	*Water testing indicates excellent water quality*
Y	Y	Y	Y	12. Quality of water associated with the wetland is high.	
Y	Y	Y	N	13. Signs of groundwater discharge are present (e.g. springs).	
				14. Water temperature suggests it is a discharge site.	*Temperatures not measured*
Y	Y	Y	Y	15. Wetland shows signs of variable water levels.	
N	Y	N	Y	16. Gravel or sandy soils present in or adjacent to wetland.	
				17. Piezometer data demonstrates discharge.	*No peizometer data*
				18. Other	
P	**P**	**P**	**Y**	Present? (Y/N) Principal? (P)	

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

FLOODFLOW ALTERATION (Storage & Desynchronization)

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
N	Y	Y	N	1. Area of this wetland is large relative to its watershed.	*Broad terraces in WC*
Y	Y	Y	Y	2. Wetland occurs in the upper portions of its watershed.	
Y	Y	Y	N	3. Effective flood storage is small or non-existent upslope of or above the wetland.	*Level uplands by WD infiltrate floodwaters*
N	N	N	N	4. Wetland watershed contains a high degree of impervious surfaces.	*Some impervious ledge*
Y	Y	Y	Y	5. Wetland contains hydric soils that are able to absorb and detain water.	
Y	Y	Y	Y	6. Wetland exists in a relatively flat area that has flood storage potential.	*In Wetland B, only lower portion is flat*
Y	Y	Y	N	7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.	
Y	Y	Y	N	8. During flood events, this wetland can retain higher volumes of water than under normal or average	*WA1: deep ponding*
Y	Y	Y	Y	9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.	*WB: at base of hill*
Y	Y	Y	N	10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.	
Y	Y	Y	N	11. Valuable properties, structures or resources are located in or near the floodplain downstream from the wetland.	
Y	Y	Y	Y	12. The watershed has a history of economic loss due to flooding.	*Flood control dams have been built along Quinebaug*
Y	Y	Y	N	13. This wetland is associated with one or more watercourses.	
N	N	N	Y	14. This wetland watercourse is sinuous or diffuse.	*Large sections of streams have been channelized*
Y	Y	Y	N	15. This wetland outlet is constricted.	*Pond & vernal pool outlets constricted, and stream in A3 crosses stone wall*
Y	Y	Y	N	16. Channel flow velocity is affected by this wetland.	*Under high flow condtiions*
Y	Y	Y	Y	17. Land uses downstream are protected by this wetland.	*Infiltration in WD lessens flood flows. Among many others.*
Y	Y	Y	Y	18.This wetland contains a high density of vegetation.	
				19.Other	
P	**P**	**P**	**Y**	Present? (Y/N) Principal? (P)	

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

FISH AND SHELLFISH HABITAT

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
Y	Y	Y	N	1. Forest land dominant in the watershed above this wetland.	
Y	Y	Y	Y	2. Abundance of cover objects present.	
				STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A PERENNIAL WATERCOURSE	
				Wetland A3 is semiperennial, with flow through the summer in most years, and supporting aquatic macroinverts.	
Y	N			3. Size of this wetland is able to support large fish/shellfish populations.	*WA1 is a permanenet pond*
Y	Y			4. Wetland is part of a larger, contiguous watercourse.	*WA2 & WB associated with small intermittent watercourse*
Y	N			5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retains some open water during winter.	
N	Y			6. Stream width (bank to bank) is more than 50 feet.	
Y	Y			7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.	
Y	Y			8. Streamside vegetation provides shade for the watercourse.	
Y	Y			9. Spawning areas are present (submerged vegetation or gravel beds).	*gravel beds*
Y	Y			10. Food is available to fish/shellfish populations within this wetland.	
N	Y			11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing, etc.) are absent from the stream reach associated with this wetland.	
Y	N			12. Evidence of fish is present.	*fish observed at man-made pond; small-mouth bass*
N	N			13. Wetland is stocked with fish.	
Y	N			14. The watercourse is persistent.	*Pond persistent, stream A3 has seasonal pools, channel is only 18-24" wide*
N	Y			15. Man-made streams are absent.	
N	Y			16. Water velocities are not too excessive for fish usage.	
N	Y			17. Defined stream channel is present.	
Y	Y	Y		18. Other	*These streams contribute steady, clean flow to the Quinebaug, enhancing the river's fisheries function*
Y	**N**	**N**	**N**	Present? (Y/N) Principal? (P)	

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

SEDIMENT/TOXICANT/PATHOGEN RETENTION

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
Y	Y	N	N	1. Potential sources of excess sediment are in the watershed above the wetland.	*Natural steep forested slopes*
Y	N	N	N	2. Potential or known sources of toxicants are in the watershed above the wetland.	*Appliances dump north of W A2*
Y	Y	Y	N	3. Opportunity for sediment trapping by slow moving water or deepwater habitat is present in this wetland.	
Y	Y	Y	Y	4. Mineral, fine grained, or organic soils are present.	
Y	Y	Y	N	5. Long duration water retention time is present in this wetland.	*A1 & B: Pond&pool; A3: low gradient, diffuseflow*
Y	Y	Y	Y	6. Public or private water sources occur downstream.	*just private water sources*
Y	Y	Y	Y	7. The wetland edge is broad and intermittently aerobic.	
Y	Y	Y	Y	8. The wetland is known to have existed for more than 50 years.	
N	N	N	Y	9. Drainage ditches have not been constructed in the wetland.	*Segments of all streams have been ditched for farming*
				STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.	
Y	Y	Y	N	10. Wetland is associated with an intermittent or perennial stream, or a lake.	
Y	Y	Y	N	11. Channelized flows have visible velocity decreases in the wetland.	*When banks overtopped & flow is thru vegetation.*
Y	N	Y	N	12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.	
N	N	N	Y	13. No indicators of erosive forces are present. No high water velocities are present.	*Only moderate flow*
Y	Y	Y	Y	14. Diffuse water flows are present in the wetland.	
Y	Y	Y	Y	15. Wetland has a high degree of water and vegetation interspersion.	*In A1 and A3. especially, with EM*
Y	Y	Y	Y	16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation is present by dense vegetation.	
Y	Y	Y	N	17. Other	*Especially during large events when stream overtops defined channel, do wetlands trap sediment carried by the stream. Otherwise sediment trapping limited to overland flow.*
Y	**Y**	**Y**	**Y**	Present? (Y/N) Principal? (P)	***Potential for this function is high, though opportunity is currently low.***

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
N	Y	Y	N	1. Wetland is large relative to the size of its watershed.	
Y	N	Y	N	2. Deep water or open water habitat exists.	*A1 & B: Pond & pool*
Y	Y	Y	Y	3. Overall potential for sediment trapping exists in the wetland.	*W D: dense low herbs trap sed.*
Y	Y	N	N	4. Potential sources of excess nutrients present in the watershed above the wetland.	*Steep rocky slopes*
Y	Y	Y	N	5. Wetland saturated for most of the season. Ponded water is present in the wetland.	
N	Y	Y	N	6. Deep organic/sediment deposits are present.	
Y	Y	Y	N	7. Slowly drained mineral, fine grained, or organic soils, are present.	
Y	Y	Y	Y	8. Dense vegetation is present.	*WD: in SS portion locally dense woody vegetation*
Y	Y	Y	Y	9. Emergent vegetation and/or dense woody stems are dominant.	
Y	Y	Y	N	10. Aquatic diversity/abundance sufficient to utilize nutrients.	*WC:Macroinvertebtrates not abundant*
Y	Y	Y	Y	11. Opportunity for nutrient attenuation exists.	*Terrestrial fauna feeds in woody plants' foliage*
Y	Y	Y	Y	12. Vegetation diversity/abundance sufficient to utilize nutrients.	*Many deep-rooted trees, shrubs*
				STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.	
Y	Y	Y	Y	13. Waterflow through this wetland is diffuse (	*Just EM part of A1 & seeps by A2), all of A3, B & D)*
Y	Y	Y	Y	14. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.	
Y	Y	Y	Y	15. Water moves slowly through this wetland.	*Gradient is low along streams, microtopography*
				16. Other	
Y	**Y**	**Y**	**Y**	Present? (Y/N) Principal? (P)	***Opportunty is low , potential high, for denitirfication as well as trapping***

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

6. PRODUCTION EXPORT (Nutrient)

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
Y	Y	Y	Y	1. Wildlife food sources grow within this wetland.	
Y	Y	Y	Y	2. Detritus development is present within this wetland	
Y	Y	Y	Y	3. Economically or commercially used products found in this wetland.	*Lumber, firewood*
Y	Y	Y	Y	4. Evidence of wildlife use found within this wetland.	*Food chain: foliage insects; tree seeds & fruits*
Y	Y	Y	Y	5. Higher trophic level consumers are utilizing this wetland.	*barred owl, fox , coyote, milk snake*
N	N	N	N	6. Fish or shellfish develop or occur in this wetland.	*Small fish may visit intermittent streams*
Y	Y	Y	Y	7. High vegetation density is present.	
Y	Y	Y	Y	8. Wetland exhibits high degree of plant community structure/species diversity.	
Y	Y	Y	N	9. High aquatic diversity/abundance is present.	WB: vernal pool, other frogs & salamanders
Y	Y	Y	N	10. Nutrients exported in wetland watercourses (permanent outlet present).	*A1, A2, A3, B: Leaf litter detritus*
Y	Y	Y	N	11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.	*Leaf detritus*
Y	Y	Y	Y	12. Wetland contains flowering plants that are used by nectar-gathering insects.	*Dewberry, violets, spicebush, Clethra*
Y	Y	Y	Y	13. Indications of export are present.	
N	N	N	Y	14. High production levels occurring however, no visible signs of export (assumes export is attenuated).	
Y	Y	Y		15. Other	*Export via food chain most important. Much detritus accumulates in slow-moving water rather than being exported*

P	**P**	**P**	**Y**	Present? (Y/N) Principal? (P)

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
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7. SEDIMENT/SHORELINE STABILIZATION

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
N	N	N	N	1. Indications of erosion or siltation present.	
Y	Y	Y	N	2. Topographical gradient is present in wetland.	*In Wetland A2, upper WA3, upper WB*
Y	Y	N	N	3. Potential sediment sources are present up-slope.	*Some natural erosion from steep slopes of E. ridges* s
N	N	Y	Y	4. No distinct shoreline or bank is evident between the waterbody and the wetland or upland. Se.	Only WD
Y	Y	N	N	5. A distinct step between the open waterbody or stream and the adjacent land exists (i.e. sharp bank) with dense roots throughout.	*No watercourse in WD.*
Y	Y	Y	N	6. Wide wetland (>10') bordering watercourse, lake, or pond.	
N	N	N	N	7. High flow velocities in the wetland.	*No watercourse in WD. Slow velocities in streams.*
N	N	N	N	8. Potential sediment sources present upstream.	*Only minor natural hillside erosion*
Y	Y	Y	N	9. The watershed is of sufficient size to produce channelized flow.	
N	N	N	N	10. Open water fetch is present.	*Open water in vernal pool (Wetland A1) is too small for erosive wave build-up*
N	N	N	N	11. Boating activity is present.	*Boats were successfully used for data collection in pond(A1)*
Y	Y	Y	N	12. Dense vegetation is bordering watercourse, lake, or pond.	*No watercourse in WD.*
Y	Y	Y	N	13. High percentage of energy absorbing emergents and/or shrubs bordering watercourse, lake or pond.	
Y	Y	Y	N	14. Vegetation comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).	*Both woody & herbaceous shoreline vegetation is dense.*
Y	Y	Y	N	15. Vegetation comprised of dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.	*Shear stress minimal in WA, WC*
Y	Y	Y	N	16. Other	*If flow volumes & velocities increased substanially, function would be more important* *This is a largely a potential function for WA1, 2, & 3 & B*
Y	**Y**	**Y**	**N**	Present? (Y/N) Principal? (P)	

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

8. WILDLIFE HABITAT

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
Y	Y	Y	N	1. Wetland is not degraded by human activity. *Mowing of ROW encouraged invasive colonizationby buckthorn in WD*
Y	Y	Y		2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards. *Nutrient levels in vernal pool slightly elevated after winter decompostion*
Y	Y	Y	Y	3. Wetland is not fragmented by development.
Y	Y	Y	Y	4. Upland surrounding this wetland is undeveloped. *Wetlands are all well buffered.*
Y	Y	Y	Y	5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, wood land, active farmland, or idle land) at least 500 feet in width.
Y	Y	Y	Y	6. Wetland contiguous with other wetland systems connected by watercourse or lake.
Y	Y	Y	Y	7. Wildlife overland access to other wetlands is present.
Y	Y	Y	Y	8. Wildlife food sources are within this wetland or are nearby.
Y	Y	Y	Y	9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
Y	Y	Y	Y	10. Two or more islands or inclusions of upland within the wetland are present.
Y	Y	Y	N	11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
N	N	N	N	12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland are present.
Y	Y	Y	Y	13. Density of the wetland vegetation is high.
Y	N	Y	N	14. Wetland exhibits a high degree of plant species diversity.
Y	Y	Y	Y	15. Wetland exhibits a high degree of diversity in plant community structure (e.g. tree, shrub, vine, grasses, mosses, etc.) *W B includes shrub clumps (willow, winterberry, spicebush, mature trees, and dense herbs*
Y	Y	Y	Y	16. Plant/animal indicator species present. *e.g. in WD Shrubland birds (prairie warble & reptiles (milk snake)*
Y	Y	Y	Y	17. Animal signs observed (tracks, scats. nesting areas, etc.) *Wood frog & spotted sal. egg masses in WA, WC*
Y	Y	Y	Y	18. Seasonal uses vary for wildlife, and wetland appears to support varied population diversity/abundance during different seasons.
Y	Y	Y	Y	19. Wetland contains or has potential to contain a high population of insects. *Especially foliage & bark insects*

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

8. WILDLIFE HABITAT *(Continued)*

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
Y	Y	Y	N	20. Wetland contains or has potential to contain large amphibian populations.	Pond-breeding amphibians:just WB
Y	Y	Y	Y	21. Wetland has a high avian utilization or its potential.	*Expected avians for habitat & landscape setting*
Y	Y	Y	Y	22. Indications of less disturbance-tolerant species present.	*Seepage plant species in W2, forest interior birds*
N	N	N	N	23. Signs of wildlife habitat enhancement present (birdhouses, nesting boxes, food sources, etc.).	
Y	Y	Y	N	24. Other	*Ledges and rock outcrops provide dens for wetland associated wildlife*
P	**P**	**P**	**P**	Present? (Y/N) Principal? (P)	

9. RECREATION

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
N	N	N	N	1. Wetland is part of a recreation area, park, forest, or refuge.	*Privately owned*
N	N	N	N	2. Fishing is available within or from the wetland.	
Y	Y	Y	Y	3. Hunting is permitted in the wetland.	
Y	Y	N	N	4. Hiking occurs or has potential to occur within the wetland.	*A few woods roads, thin underbrush except in WD*
Y	Y	Y	Y	5. Wetland is a valuable wildlife habitat.	
Y	Y	Y		6. The watercourse, pond, or lake, associated with the wetland is unpolluted.	
Y	Y	Y	Y	7. High visual/aesthetic quality of this potential recreation site.	*Tall, mature evergreens, scenic tussock sedge marsh*
N	N	N	N	8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.	
N	N	N	N	9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.	
N	N	N	N	10. Off-road public parking available at the potential recreation site.	*Not at present*
Y	Y	N	Y	11. Accessibility and travel ease is present at this site.	*Understory density is highin WB & WC, WD: meadow*
N	N	N	N	12. The wetland is within a short drive or safe walk from highly populated public and private areas.	
Y	Y	Y	Y	13. Other	*Quinnebaug River is nearby, suitable for boating & fishing.*
Y	**Y**	**N**	**Y**	Present? (Y/N) Principal? (P)	

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

10. EDUCATIONAL/SCIENTIFIC VALUE

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS	
N	N	N	N	1. Wetland contains or is known to contain threatened, rare, or endangered species.	
Y	Y	Y	Y	2. Little or no disturbance is occurring in this wetland.	*Past quarrying and logging*
Y	N	N	Y	3. Potential educational site contains a diversity of wetland classes that are accessible or potentially accessible.	*Each wetland has a unique cover class. Also a range of hydrogic regimes, geomorphic settings*
Y	Y	Y	N	4. Potential educational site is undisturbed and natural.	*Wetland D is maintained as a power line*
Y	Y	Y	Y	5. Wetland is considered to be a valuable wildlife habitat.	*Rural landscape setting increases bird diversity*
N	N	N	N	6. Wetland is located within a nature preserve or wildlife management area.	
N	N	N	N	7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).	
N	N	N	N	8. Off-road parking at potential educational site suitable for school bus access in or near wetland.	
N	N	N	N	9. Potential educational site is within safe walking distance or a short drive to schools.	
Y	Y	Y	Y	10. Potential educational site within safe walking distance to other plant communities.	
N	N	N	N	11. Direct access to perennial stream at potential educational site available.	*Quinnebaug River is very nearby*
Y	N	Y	N	12. Direct access to pond or lake at potential educational site available.	*WA1, WB: Pond & Vernal pool*
N	Y	Y	Y	13. No known safety hazards within the potential educational site.	*WA1(pond) is deep enough to be a drowning hazard*
Y	Y	Y	Y	14. Public access to the potential educational site is controlled.	
N	N	N	N	15. Handicap accessibility is available.	
N	N	N	N	16. Site is currently used for educational or scientific purposes.	
Y	Y	Y	Y	17. Other	*Diverse herbs and mosses of seepage wetlands of botanical interest*
Y	**Y**	**Y**	**Y**	Present? (Y/N) Principal? (P)	

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Wetland Functions and Values, a Descriptive Approach
(Continued)

11. UNIQUENESS/HERITAGE

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
N	N	N	N	1. Upland surrounding wetland primarily urban.
N	N	N	N	2. Upland surrounding wetland developing rapidly.
N	N	N	N	3. More than 3 acres of shallow permanent open water occur in wetlands (less than 6.6 feet deep) including streams.
N	Y	N	N	4. Three or more wetland classes present. Three wetland classes present on site,well-developed in diff. wetlands
Y	Y	Y	N	5. Deep and/or shallow marsh, or wooded swamp dominant.
N	Y	Y	N	6. High degree of interspersion of vegetation and/or open water occurring in this wetland.
Y	Y	Y	N	7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
N	N	N	N	8. Potential educational site is within a short drive or a safe walk from schools.
N	N	N	N	9. Off-road parking at potential educational site is suitable for school buses.
Y	N	N	N	10. No known safety hazards exist within this potential educational site.
N	N	N	N	11. Direct access to perennial stream or lake at potential educational site. *However, Quinnebaug River nearby*
Y	Y	Y	Y	12. Two or more wetland classes visible from primary viewing locations.
Y	Y	Y	Y	13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) visible from primary viewing locations.
N	N	N	N	14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
Y	Y	Y	Y	15. Large area of wetland is dominated by flowering plants, or plants that turn vibrant colors in different seasons. *Red maples, violets,*
Y	Y	Y	Y	16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
Y	Y	N	Y	17. Overall view of the wetland is available from the surrounding upland. *In winter at least*

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11. UNIQUENESS/HERITAGE *(Continued)*

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
Y	Y	Y		18. Quality of the water associated with the wetland is high.
Y	Y	Y	Y	19. Opportunities for wildlife observations are available.
N	N	N	N	20. Historical buildings occur within the wetland.
Y	N	Y	N	21. Presence of pond or pond site and remains of a dam occur within the wetland. *WB: vernal pool*
N	N	N	N	22. Wetland within 50 yards of the nearest perennial watercourse.
Y	N	N	N	23. Visible stone or earthen foundations, berms, dams, standing structures or associated features occur within the wetland. *Springhouse in W A1 , stone walls crossing W A3*
N	N	N	N	24. Wetland contains critical habitat for a state or federally listed threatened or endangered species.
N	N	N	N	25. Wetland is known to be a study site for scientific research.
N	N	N	N	26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
Y	Y	Y	Y	27. Wetland has local significance because it serves several functional values.
N	N	N	Y	28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique. *Good examples: WA3: Saturated stream terrace w.deep peat; WA2:seepage plants*
N	N	N	N	29. Wetland is known to contain an important archaeological site.
N	N	N	N	30. Wetland is hydrologically connected to a state or federally designated scenic river.
N	N	N	N	31. Wetland is located in an area experiencing a high wetland loss rate.
				32. Other
N	N	N	N	Present? (Y/N) Principal? (P)

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Wetland Functions and Values, a Descriptive Approach
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12. VISUAL QUALITY/AESTHETICS

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
Y	Y	N	Y	1. Multiple wetland classes visible from primary viewing locations.
Y	Y	Y	N	2. Emergent marsh and/or open water visible from primary viewing locations.
Y	Y	Y	Y	3. Diversity of vegetation species visible from primary viewing locations.
Y	Y	Y	Y	4. Wetland dominated by flowering plants, or plants that turn vibrant colors in different seasons.
Y	Y	Y	Y	5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
Y	Y	Y	Y	6. Visible surrounding land use form contrasts with wetland. *Ridges rise up between wetlands. Evergreens contrast*
N	N	Y	Y	7. Wetland views absent of trash, debris, and signs of disturbance. *Appliance dump between Wetland A2 & A3.*
Y	Y	Y	Y	8. Wetland is considered to be a valuable wildlife habitat.
Y	Y	N	Y	9. Wetland is easily accessed. *WD: via meadow along woods edgel, though Interior of shrub swamp poorly accessible*
Y	Y	Y	Y	10. Low noise level at primary viewing locations.
Y	Y	Y	Y	11. Unpleasant odors absent at primary viewing locations.
Y	Y	N	Y	12. Relatively unobstructed sight line exists through wetland. *In spring & winter season*
				13. Other

P	**P**	**Y**	**Y**	Present? (Y/N) Principal? (P)

The Highway Methodology Workbook:
Wetland Functions and Values, a Descriptive Approach
(Continued)

13. ENDANGERED SPECIES HABITAT

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
Y	Y	Y	N	1. Wetland contains or is known to contain threatened or endangered species.
N	N	N	N	2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.
				3. Other
Y	**Y**	**Y**	**N**	Present? (Y/N) Principal? (P)

14. FISH AND SHELLFISH HABITAT (Supporting marine resources)

Wetland A1/2	Wetland A3	Wetland B	Wetland D	CONSIDERATIONS/QUALIFIERS
N	N	N	N	1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
Y	N	N	N	2. Suitable spawning habitat is present at the site or in the area. *Gravel beds*
N	N	N	N	3. Commercially or recreationally important species are present or suitable habitat exists.
N	N	N	N	4. The wetland/waterway supports prey for higher trophic level marine organisms.
N	N	N	N	5. The waterway provides migratory habitat for anadromous fish. *Downriver dams without fishways*
Y	Y	Y	Y	6. Other *As a steady source of clean water, low in nutrients, it supports estuarine function.*
N	**N**	**N**	**N**	Present? (Y/N) Principal? (P)

APPENDIX E-2 – WETLAND REPORT: EXISTING CONDITIONS

WETLAND REPORT: EXISTING CONDITIONS

KILLINGLY ENERGY CENTER

LAKE ROAD, KILLINGLY, CONNECTICUT

June 2016

REMA

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ATTACHMENTS

Attachment A On-Site Soil Investigation & Wetland Delineation Report
Attachment B Wetland Delineation & Characterization Field Forms
Attachment C Photographs
Attachment D Surface Water Sampling Results

1.0 INTRODUCTION

This *Wetland Report: Existing Conditions* describes the in-field delineation and characterization of regulatory wetlands and watercourses by Rema Ecological Services, LLC (REMA) on the proposed Killingly Energy Center site (the site, the study area) during the early part of the 2016 growing season.

Specifically, two REMA staff[1] with expertise in soils, ecology, botany, and wildlife visited the subject site starting on February 4, 2016. The last site visit, for the purpose of baseline ecological inventories covered in this document, was conducted on June 13, 2016. In all, REMA staff visited the site on 15 different days since early February 2016, logging in excess of 80 hours in the field.

2.0 STUDY AREA SETTING

The study area encompasses roughly 73 acres of land in Killingly, Connecticut. Of this acreage, roughly 63 acres (the Generating Facility Site) fall to the north and northwest of Lake Road, while the balance (approximately 10 acres) (the Switchyard Site) is located to the south and southeast of Lake Road. The site is located west of Alexander Lake and Interstate 395, and few hundred feet south and east of the Quinebaug River (see Figure 1). An Eversource electric transmission right-of-way abuts the site to the southeast.

3.0 PAST LAND USE

The site was predominantly in agricultural use through the 1970s, based on archived aerial photography,[2] with the exception of the prominent northwesterly ridge, which was periodically logged; bedrock quarrying also took place at this ridge until the mid-1980s. Agricultural activities included pasturing, hay production, and arboriculture (i.e., fruit trees). A farmhouse is located within the Generating Facility Site, while an abandoned barn is located on the Switchyard Site. Stone walls are still visible, demarcating the

[1] The primary staff for the baseline natural resources studies included: George T. Logan, MS, PWS, CSE, and Sigrun N. Gadwa, MS, PWS.
[2] Archived aerials were viewed for flight years: 1934, 1951, 1965, 1970, 1986, and 1996.

edges of fields and pastures. Since the 1970s, the once open fields have reverted to young second-growth forest; some of it still in the pole size class.[3]

A small "farm pond" is located on the Generating Facility Site. This pond was reportedly developed in 1959 for use as a source of potable water for the farmhouse and also as a swimming hole. It is located at the head of a wetland seep, the headwaters of a small intermittent stream that leads to a central forested swamp on the Generating Facility Site. Portions of this steam have been channelized as a result of past agricultural activities. A pump house was built to the east of the pond.

Further west, a cistern was once constructed over a hillside seep that is located at the southwesterly edge of the forested swamp centrally located on the Generating Facility Site. From this location, a ditch was dug through the axis of the forested swamp to a stone wall at the eastern property boundary. This is the intermittent watercourse associated with the primary wetland system located on the Generating Facility Site.

4.0 SURFACE WATER RESOURCES & WETLANDS

4.1 Introduction

The study area's wetlands and surface waters (shown in Figure 2) were first characterized by examining federal and state wetlands maps and by conducting detailed site investigations of vegetation, soils, and hydrology to demarcate jurisdictional wetland boundaries. An *n Site Soil nvestigation Wetland Delineation Report* is included as Attachment A of this *Wetland Report: Existing Conditions*, and provides detailed information on the site's upland and wetland soil types. Attachment B provides *Wetland Delineation Characterization Field Forms* for each of the wetland ecological units, with detailed descriptions and inventories. Attachment C provides representative annotated photographs of each of these regulated resource areas, while Attachment D provides the results of surface water sampling. This section briefly describes the overall wetland and surface water resources (i.e., streams and open water habitats) associated with the study area.

[3] Pole size class is a forestry term reflecting trees of 4 inches to 10 inches diameter at breast height that would not be considered large enough for use as sawtimber, and can reflect a stand whose trees average this size.

All of the wetlands and surface waters within the study area were field-delineated in accordance with both state and federal statutes and criteria by a professional wetland/soil scientist.[4] State regulated wetlands were delineated in accordance with the Inland Wetlands and Watercourses Act (Connecticut General Statutes §22a-38). Federal jurisdictional wetlands were delineated pursuant to the Regional Supplement to the Corps of Engineers Wetland Delineation Manual (1987): Northcentral and Northeast Region, Version 2.0 (2012).

4.2 Wetland Flow Patterns

Wetland flow patterns within the Generating Facility Site are defined by the bedrock topography. Only one bedrock type is present on the site, a pale gray to pink, medium-grained felsic gneiss. A spring-fed, man-made pond (Wetland A1) and the pond's outlet stream (Wetland A2) are bordered to the east by a ridge on the eastern boundary of the Generating Facility Site (with a summit at 342.8 feet above mean sea level (amsl)), and to the west by a hill of similar height. Deep till soils on their slopes (Canton and Charlton series) have high moisture-holding capacity, and gradually discharge groundwater into Wetland A1 and Wetland A2.

Wetland Unit A3 (Wetland A3) also drains northerly along the west side of the central hill across nearly level glacial outwash soils. Wetland A3 joins the stream from Wetland A2 near the eastern property boundary, and the combined stream continues off-site towards the Quinebaug River. On the west side of the Generating Facility Site, the terrain reaches a maximum elevation of about 340 feet amsl in the northwestern corner, with the southwestern corner lower in elevation. The upper portion of the hillside swamp in Wetland B is at an elevation of approximately 257 feet amsl. The outlet intermittent watercourse from this wetland traverses glacial till and sandy outwash hillsides en route to the Quinebaug River.

4.3 Wetland Characteri ation Units

The A series of wetlands are interconnected and comprise the major wetland system on the Generating Facility Site. Other wetlands on the Generating Facility Site are smaller pockets (Wetland B, C, E and X). A portion of Wetland D extends onto the Switchyard

[4] i.e., George T. Logan, MS, PWS, CSE.

Site from the Eversource right-of-way. Each are shown on Figure 2 and described in the sections below.

4.3.1 Man Made Pond (Wetland 1) – Generating Facility Site

Located downgradient and to the northwest of the existing residence, Wetland A1 is a roughly 0.25-acre man-made pond, originally developed in 1959 as a swimming-hole and a source of water for the then-active farm, according to the property owner (see Figure 2 and Attachment B). As a spring-fed pond, it is fed by both groundwater discharge and a small rivulet associated with a springhouse. The hydro-geomorphic setting is classified as "groundwater depression" within the pond, and "groundwater slope" on adjacent wetlands. It is largely shaded by trees, both broad-leaf deciduous and evergreen ("palustrine forested" cover type), resulting in cool temperatures and good water quality.

Pond depth fluctuates seasonally, but it retains some water year-round according to the property owner. Its depth was measured in April 2016 and found to be five feet near its earthen embankment and two to three feet deep near the perimeter, with a one to two foot layer of soft organics over the hard sandy bottom. Field investigations found numerous juvenile smallmouth bass, and several adult fish, as well as invertebrates and amphibians (e.g., water scorpions, predaceous diving beetles, crayfish, snails, and green frogs, bull frogs, and spring peepers). Spotted salamander egg masses were found in early spring; although emergence of salamanders is unlikely, as smallmouth bass are effective predators of salamander larvae. In fact, all of the egg masses observed in mid-April were observed to have been preyed upon a few days later.

The man-made pond shoreline supports an emergent cover type on very poorly drained soil, high in organics. It is vegetated with native wetland plants (e.g., swamp bedstraw, native sedges, and jewelweed) rather than planted with lawn. Duckweed and green algae were observed in early spring, when thawing vegetation makes nutrients from natural vegetation readily available, but water quality testing (Attachment D) showed that nutrient levels are close to reference levels for a non-impaired forested stream. By June, a patch of yellow pond-lily was observed in the deeper portion of the pond, near its outlet.

4.3.2 Eastern ntermittent Stream (Wetland 2) – Generating Facility Site

Wetland A2 and its associated intermittent stream is approximately 1.98 acres. It begins at the outlet to Wetland A1 and extends northwesterly (see Figure 2 and Attachment B). This intermittent stream has a stony substrate in its upper reach, near the pond, becoming sandier as soils transition from those derived from glacial till to sandy glacial outwash deposits.

Water quality is very good in this stream (see Attachment D), consistent with the water source, which is groundwater discharge from a forested watershed. The intermittent watercourse associated with Wetland A2 has well vegetated banks, only a few inches above the water surface, rather than a channel that is incised deeply into the ground. Steady groundwater discharge improves stream channel morphology, reducing the potential for erosion of the banks and stream bed. It is also associated with elevated plant diversity. Regardless of the type of bedrock, the groundwater discharge and shallow, flowing groundwater furnish a steady supply of soil minerals (through weathering of rock and soil particles). Indicator species in Wetland A2 are golden saxifrage, ironwood, yellow birch, and Pennsylvania cress, as well as diverse sedges, typical of headwaters wetlands fed by clean groundwater from till soils.

4.3.3 Central Wetland (Wetland 3) – Generating Facility Site

This is the largest wetland unit at the Generating Facility Site (see Figure 2 and Attachment B), approximately 6.26 acres. Underlying sandy outwash surficial materials determine the nature of Wetland A3. Extensive, very poorly drained, peaty soils support sunny emergent marsh on the east side of the swamp, dominated by tussock sedge and skunk cabbage, and also thickets of red maple saplings. Blue swamp violet is abundant on saturated, shaded soils. The sandy/mucky soils (Walpole and Scarboro soil series) offer poor support for tree roots, such that “tree tips” are common, typically associated with deeper open water by the upturned root mass and variable micro-topography. The hydro-geomorphic setting of Wetland A3 is classified as “groundwater slope,” because the low-gradient wetland intercepts the sub-regional groundwater table in the permeable and sandy outwash soils. High stem density and organic substrate with good capacity for toxin adsorption means high potential for water quality renovation/polishing.

The northwest side of the wetland consists of gently sloping forest dominated by Eastern hemlock. This portion of the wetland is also underlain by sandy outwash soil, but with

a deeper water table than for the eastern portion described above. Soils are mostly poorly drained rather than very poorly drained. Herbaceous vegetation is sparse under the hemlocks, and differs little from that in moist upland forest. The outer swath of the wetland is well suited to infiltration of excess precipitation and the wetland's broad shape and variable microtopography allows for flood storage.

Other habitat features within this wetland include large diameter trees, both oaks and hemlocks, and a few white pines, tree tips, and old stone walls (one parallel to the southern wetland boundary). Ledge outcrops are located within 100 feet of the delineated wetland line to the northwest, which provide a striking visual contrast to the swamp.

The off-site outlet stream, which flows from both Wetlands A1 and Wetland A2, is intermittent but, based on the presence of aquatic organisms observed in the stream substrate (e.g., crane fly larvae, case caddisflies), it appears that it flows continually most years, but may dry up some years.

4.3.4 Northwestern Wetland (Wetland) – Generating Facility Site

Wetland B is approximately 1.8 acres located at the far northwestern section of the Generating Facility Site (see Figure 2 and Attachment B). The southeastern part of Wetland B is a forested hillside with deep, friable, poorly drained soils derived from glacial till (Leicester series); spicebush and winterberry are the dominant shrubs, with red maple the dominant tree. The plant diversity in the southeastern, seasonally saturated lobe of Wetland B (with wildflowers like bloodroot, wood anemone, and dwarf ginseng) is typical of headwaters wetlands fed by clean groundwater from till soils. Regardless of the type of bedrock, the groundwater discharge though glacial till yields a steady supply of soil minerals, which influences vegetative composition and diversity.

The hillside discharges both surface and groundwater flow (and fine silt) into the seasonally flooded, lower portion of Wetland B. This portion of Wetland B is also forested, with both evergreen and broadleaf trees. This level area has several depressions, one deep enough for breeding of vernal pool amphibians (wood frog and spotted salamander). The steady supply of groundwater, continuing into mid-summer, prolongs the hydroperiod in Wetland B and improves the chances of successful metamorphosis for juvenile vernal pool amphibians, and also for other species observed here, like spring peeper and gray tree frog. In Wetland B, rock dams have altered the

outlet flow, increasing the effective depth of the pool area, which would also benefit species use.

Trees on the lower terrace include black willow, as well as red maple and Eastern hemlock; level terraces support lush floodplain species such as jewelweed, *Glyceria striata* (a swamp grass), and false nettle. Moss-covered logs crisscross the wetland, and several large tree tips contribute habitat structure and small pockets of palustrine scrub-shrub habitat. As in Wetland A3, a peripheral zone (on the north side) is shaded by hemlock and, thus, has sparse vascular vegetation. The hydro-geomorphic setting is classified as "groundwater slope."

Much of the flow within Wetland B is expected to infiltrate especially as it reaches Hinckley soil, continuing, subsurface, towards the Quinebaug River. Flow from Wetland B, when full infiltration does not occur, combines with discharge from Wetland C in an off-site stream that is a higher-gradient, more deeply incised stream that is lower in flow than other streams noted on-site. During the field visits in the spring season, stream flows within this off-site stream reached the river. Hemlock or white pine foliage overhangs most of the narrow stream, such that light levels are very low, resulting in very sparse riparian vegetation, with only occasional cinnamon fern, Virginia creeper, or Canada mayflower.

4.3.5 Western utlet (Wetland C) – Generating Facility Site

Wetland C is an approximately 0.08-acre hillside swale that joins (with Wetland B) an off-site stream from the east (see Figure 2 and Attachment B). Wetland C does not qualify as a watercourse, lacking a defined channel. Its vegetation includes sparse skunk cabbage, some barberry, birch saplings, and red maples.

Much of the surface flow associated with this wetland unit is expected to infiltrate, especially as it reaches Hinckley soil, continuing, subsurface, towards the Quinebaug River.

4.3. Wetland Pocket (Wetland E) – Generating Facility Site

This small +/- 0.04-acre wetland pocket is located upgradient of Wetland C at the far northern section of the Generating Facility Site (see Figure 2 and Attachment B). Topography is slightly concave in this area, allowing for shallow ponding within this wetland early in the growing season, on tight silty till-derived soils. Wetland E overflows via a broad swale, down moderate slopes, toward Wetland C, which is located about 100 feet to the west.

Wetland E is a seasonally flooded to seasonally saturated wetland with poorly drained soils and a hydro-geomorphic setting classified as "surface water slope." It is dominated by hemlock in the overstory and, due to dense shading, little vegetation grows in the understory. A few violets, wood ferns, poison ivy, grasses, and New York fern were observed here.

4.3.7 Disturbed Wetland Pocket (Wetland) – Generating Facility Site

Located to the southwest of Wetland A2, and close to the Wetland A1, this is a roughly 0.027-acre, narrow wetland with disturbed soils (see Figure 2 and Attachment B). Wetland X is within an area that has historically been farmed and used as a travel way to other portions of the overall site. Old tire ruts are obvious throughout this area, and the soils have been graded in the past (i.e., filled and/or excavated).

This is a seasonally saturated wetland devoid of an overstory, but with hydrology suitable for hydrophytes such as skunk cabbage and sensitive fern, and a few sedges. Multiflora rose and Japanese barberry are growing along the edge of this wetland, which overflows northerly over an old fill embankment to Wetland A2.

4.3.8 Right of Way Wetland (Wetland D) – Switchyard Site

The majority of the Switchyard Site is upland, consisting of post-agricultural deciduous woods and shrub tangles on moderately to gently sloping land, with a level mowed field within its northernmost section. A limited wetland area is located along the parcel's eastern property boundary, mostly off-site and within an Eversource electric power line right-of-way. Wetland D is part of a relatively large non-forested area.

Wetland D, which encompasses approximately 0.51 acres of the Switchyard Site, is dominated by scrub shrub and emergent (i.e., wet meadow) cover types, mostly with

poorly drained, outwash-derived soils (see Figure 2 and Attachment B). The scrub shrub portion of this wetland is dominated by white pine and red maple saplings, but also includes shrubs such as highbush blueberry, meadowsweet, and willows. The northern scrub shrub section of this wetland unit is dominated by invasive European (glossy) buckthorn, which is spreading. Herbaceous and shrub diversity is highest along the edges of the shrub thicket; including blue-eye grass, rough-stem goldenrod, cinnamon, royal, New York, and sensitive ferns, steeplebush, sedges, and nannyberry viburnum.

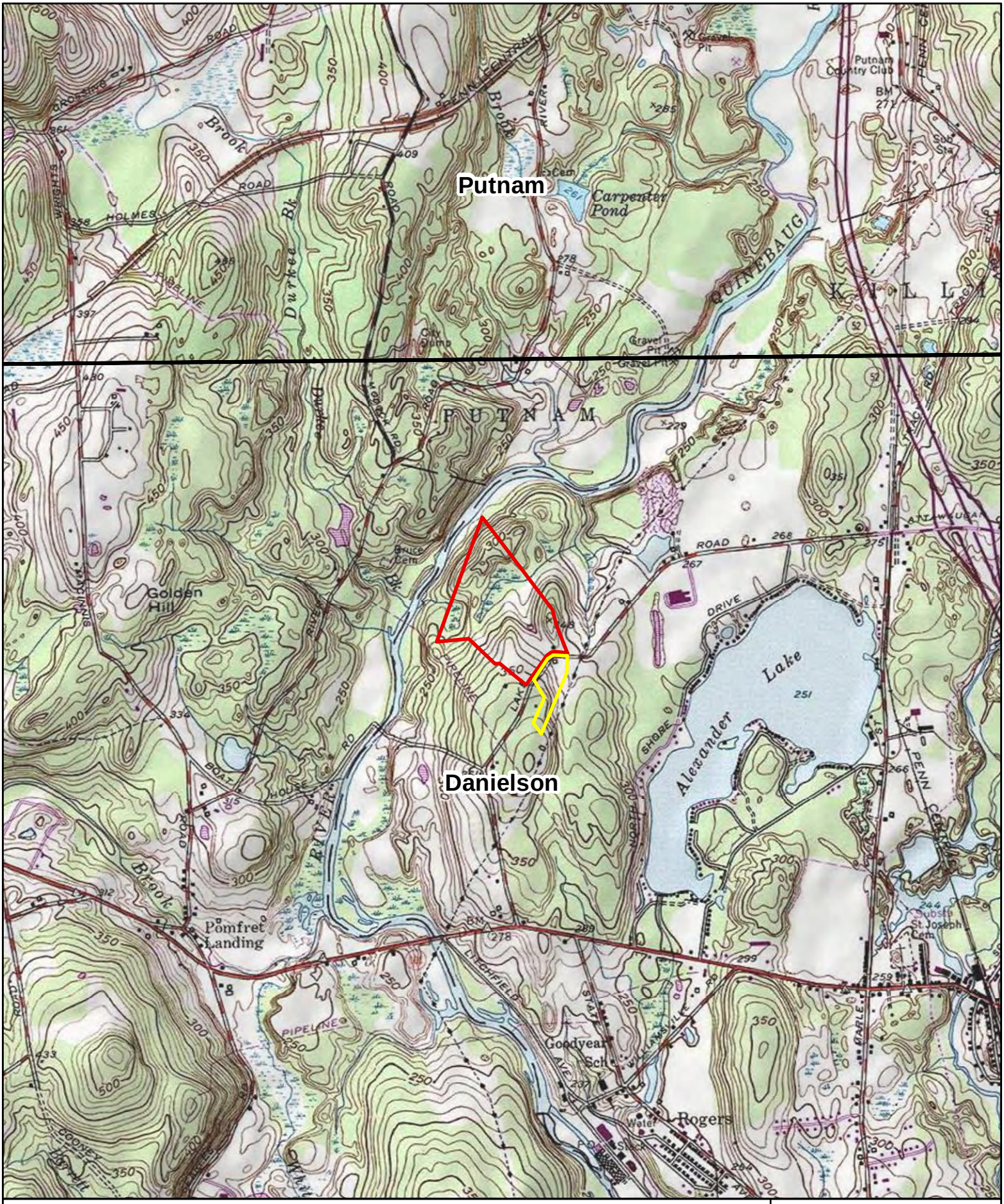
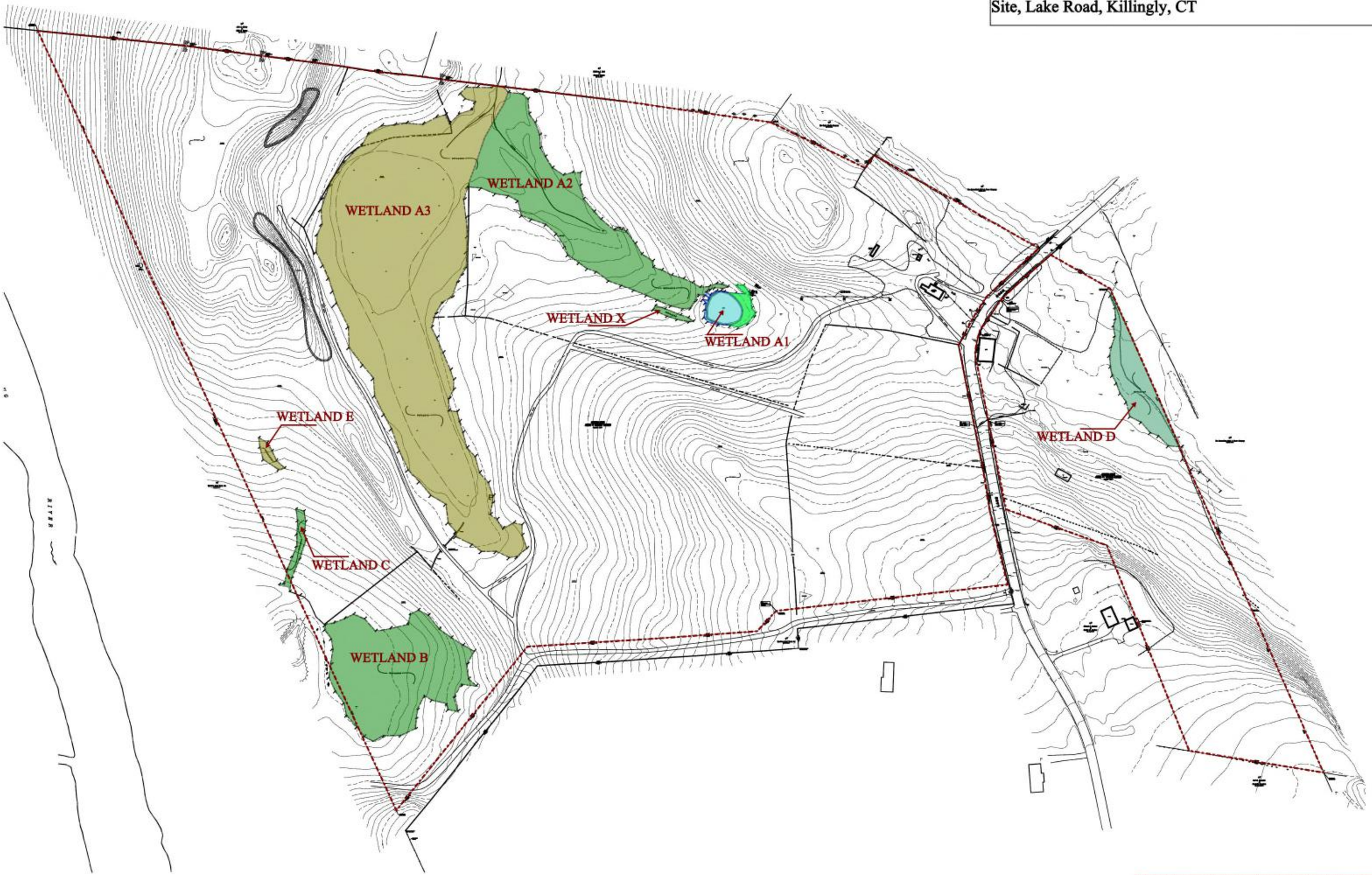


Figure 1: Site Locus; Generating Facility Site and Switchyard Site

Lake Road, Killingly, CT

FIGURE 2: Wetland Units at the Killingly Energy Center Site, Lake Road, Killingly, CT



PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 6-16-16 ***SCALE***: NTS

Attachment A

On-Site Soil Investigation & Wetland Delineation Report

REPORT DATE: June 15, 2016

REMA ECOLOGICAL SERVICES, LLC
164 East Center Street, Suite 8
Manchester, CT 06040
860.649.REMA (7362)

ON-SITE SOIL INVESTIGATION & WETLAND DELINEATION REPORT

PROJECT NAME & SITE LOCATION:
+/- 62.9 and 10.1 acres (2 parcels)
Lake Road
Killingly, CT

REMA Job No.: 16-11897-KIL7
Field Investigation Date(s): 3/11, 3/24, 3/31, 4/13/16
Field Investigation Method(s):
- ☒ Spade and Auger
- ☐ Backhoe Test Pits
- ☐ Other:

REPORT PREPARED FOR:
Tetra Tech
2 Lan Drive, Suite 210
Westford, MA 01886
Attn.: Lynn Gresock, VP

Field Conditions:
Weather: Sunny to Overcast, 40s to 60s
Soil Moisture: Moderate-High
Snow Depth: none
Frost Depth: none

Purpose of Investigation:
- ☒ Wetland Delineation/Flagging in Field
- ☐ Wetland Mapping on Sketch Plan or Topographic Plan
- ☐ High Intensity Soil Mapping by Soil Scientist
- ☒ Medium Intensity Soil Mapping from '*The Soil Survey of Connecticut*' Maps (USDA-NRCS)
- ☐ Other:

Base Map Source(s): CT Soil Survey (USDA-NRCS) (attached); Figures A1, A2, A3, and B (attached)

Wetland Boundary Marker Series: RES-A-1 to RES-A-48, tied to RES-1A-1 to RES-1A-24, tied to RES-2A-1 to RES-2A-30, tied to RES-3A-1 to RES-3A-69 (open line), RES-X-1 to RES-X-9 (closed line), RES-B-1 to RES-B-41 (closed line) (with intermittent stream draining wetland), RES-C-1 to RES-C-16 (open line), RES-D-1 to RES-D-26 (open line), and RES-E-1 to RES-E-8 (closed loop)

General Site Description/Comments: The "study area" or "site" encompasses +/-73.02 acres of land (2 parcels), to the northwest and southeast of Lake Road, in Killingly, CT. In its present state the larger parcel is comprised of mixed deciduous/evergreen and evergreen forest on uplands, deciduous/evergreen forested wetlands, and a small man-made pond. The smaller parcel contains an open field, post-agricultural deciduous woods, evergreen/deciduous forest, shrub/vine tangles, and a portion of a scrub-shrub and emergent wetlands complex. The soils within the study area are mostly undisturbed in nature, and are predominately derived from glacial till (i.e. unstratified sand, silt & rock), including areas interspersed with bedrock outcrops, and glacial outwash (i.e. stratified sand & gravel). Locally the soils are disturbed and are associated with a residence (northern parcel), with a barn (southern parcel), as well as with past agriculture. The undisturbed upland soils are the somewhat excessively drained Gloucester (36), the excessively drained Hinckley (38), the well drained Canton and Charlton (62), Charlton and Chatfield (73), and Hollis-Chatfield-Rock outcrop (75) soils series complexes and mapping units, and the moderately well drained Sutton (52) soil series, and Ninigret and Tisbury (21) soil series complex. The disturbed upland soils are mapped as Udorthents (308). The undisturbed wetland soils are the poorly drained Walpole (13) sandy loam, the very poorly drained Scarboro (15) muck, and the very poorly and poorly drained Ridgebury, Leicester, and Whitman (3) soil series complex. The disturbed wetland soils are mapped as Aquents (308w). The larger parcel contains one contiguous, centrally located headwaters forested wetland, with a nearly level section, and a "lobe" extending southerly on gentle slopes. A man-made pond occurs at far upper reach (southern) of this lobe. A semi-perennial stream emanates from the overall wetland. Near the western boundary of the larger parcel, there is another forested wetland with an intermittent stream outlet. A small wetland pocket and narrow seasonal seep wetland occur near the western property boundary. At the smaller parcel a scrub-shrub/emergent wetland was delineated, the western edge of a larger off-site wetland that extends within the Eversource electric right-of-way to the east.

ON-SITE SOIL INVESTIGATION & WETLAND DELINEATION REPORT *(CONTINUED)*

PROJECT NAME & SITE LOCATION: +/- 73.02-acres (2 parcels)
Lake Road, Killingly, CT

SOIL MAP UNITS

Upland Soils

Udorthents (308). This soil mapping unit consists of well drained to moderately well drained soils that have been altered by excavation (i.e. sand and gravel borrow pits). The areas either have had two feet or more of the upper part of the original soil removed or have more than two feet of fill material on top of the original soil. Udorthents or Made Land soils can be found on any soil parent material but are typically fluvial on glacial till plains and outwash plains and stream terraces.

Hinckley gravelly loamy sand (38). This series consists of very deep, excessively drained soils formed in a shallow, loamy sand mantle underlain by gravelly sand, water deposited glacial outwash materials. They are level to very steep soils on outwash plains, terraces, deltas, kames and eskers. The soils formed in loamy over stratified sandy and gravelly glacial outwash derived mainly from crystalline rocks. Typically these soils have a very dark grayish brown loamy sand surface layer 7 inches thick. The subsoil layers from 7 to 15 inches are strong brown and yellowish brown gravelly loamy sand. From 15 to 18 inches the subsoil is yellowish brown gravelly sand. The substratum from 18 to 60 inches is light olive brown stratified sand, gravel and cobblestones.

Canton stony fine sandy loam (62). This series consists of deep, well drained soils formed in a coarse-loamy mantle underlain by sandy glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of very dark grayish brown fine sandy loam 2 inches thick. The subsoil from 2 to 23 inches is yellowish brown fine sandy loam, gravelly fine sandy loam and gravelly sandy loam. The substratum from 23 to 60 inches is pale brown gravelly loamy sand.

Charlton very stony fine sandy loam (73). This series consists of very deep, well drained coarse-loamy soils formed in friable, glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. In tilled areas, these soils have a surface layer of dark brown fine sandy loam 8 inches thick. The subsoil from 8 to 26 inches is yellowish brown fine sandy loam and sandy loam. The substratum from 26 to 60 inches or more is grayish brown gravelly fine sandy loam.

Chatfield loam (73). This series consists of moderately deep, well drained, and somewhat excessively drained soils formed in till. They are nearly level to very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 to 70 percent. Crystalline bedrock is at depths of 20 to 40 inches. Permeability is moderate or moderately rapid. In tilled areas, these soils have a surface layer that is very dark to dark grayish brown loam up to 8 inches thick. The subsoil from 8 to 26 inches is brown, flaggy silt loam.

Hollis fine sandy loam (75). This series consists of shallow, well drained and somewhat excessively drained; loamy soils formed in a thin mantle of friable glacial till over ledge. Depth to bedrock ranges from 10 to 20 inches. They occur on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of dark grayish brown fine sandy loam 3 inches thick. The subsoil from 3 to 14 inches is yellowish brown fine sandy loam. Hard and unweathered bedrock lies under the subsoil.

Gloucester sandy loam (58). This series consists of deep, somewhat excessively drained soils formed in a coarse-loamy glacial till on uplands. They are nearly level to very steep soils on till plains and hills. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of very dark grayish brown sandy loam 4 inches thick. The subsoil from 4 to 25 inches is dark yellowish brown gravelly sandy loam and loamy sand. The substratum from 25 to 60 inches is light olive brown to light grayish brown gravelly, loamy coarse sand.

Sutton stony fine sandy loam (52). This series consists of deep, moderately well drained loamy soils formed in friable, glacial till on uplands. They are nearly level to steeply sloping soils on till plains, low ridges and hills, being typically located on lower slopes and in slight depressions. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of dark brown fine sandy loam 8 inches thick. The subsoil from 8 to 28 inches is yellowish brown, mottled fine sandy loam and sandy loam. The substratum from 28 to 60 inches or more is light olive brown fine sandy loam.

ON-SITE SOIL INVESTIGATION & WETLAND DELINEATION REPORT *(CONTINUED)*

PROJECT NAME & SITE LOCATION: +/- 73.02-acres (2 parcels)
Lake Road, Killingly, CT

SOIL MAP UNITS

Upland Soils

Ninigret fine sandy loam (21). This series consists of very deep moderately well drained soils formed in a coarse-loamy mantle underlain by sandy water deposited glacial outwash materials. They are nearly level to gently sloping soils on glaciofluvial landforms, typically in slight depressions and broad drainage ways. The soils formed in loamy over stratified sandy and gravelly outwash derived from a variety of acid rocks. Typically, these soils have a very dark grayish brown fine sandy loam surface layer 8 inches thick. The subsoil from 8 to 26 inches is yellowish brown fine sandy loam with mottles below 16 inches. The substratum from 26 to 60 inches is mottled, pale brown, loose, stratified loamy sand.

Tisbury silt loam (21). This series consists of deep, moderately well drained soils formed in a coarse-silty mantle underlain by sandy water deposited glacial outwash materials. They are level to gently sloping soils in broad drainage swales and low lying positions on outwash plains and terraces. The soils formed in loamy over stratified sandy and gravelly glacial outwash derived mainly from acid crystalline rocks (granite, gneiss and schist). Typically these soils have a very dark grayish brown silt loam surface layer 8 inches thick. The subsoil from 8 to 26 inches is yellowish brown and brownish yellow silt loam, with mottles common below 16 inches. The substratum from 26 to 60 inches is grayish brown, mottled stratified sand and gravel.

Wetland Soils

Aquents (308w). This soil map unit consists of poorly drained and very poorly drained, disturbed land areas. They are most often found on landscapes which have been subject to prior filling and/or excavation activities. In general, this soil map unit occurs where two or more feet of the original soil surface has been filled over, graded or excavated. The Aquents are characterized by a seasonal to prolonged high ground water table and either support or are capable of supporting wetland vegetation. Aquents are recently formed soils which have an aquic moisture regime. An aquic moisture regime is associated with a reducing soil environment that is virtually free of dissolved oxygen because the soil is saturated by groundwater or by water of the capillary fringe. The key feature is the presence of a ground water table at or very near to the soil surface for a period of fourteen days or longer during the growing season.

Scarboro muck (15). This series consists of very deep, very poorly drained soils formed in sandy water deposited glacial outwash materials. They are nearly level soils on glaciofluvial landforms, typically in low depressions and drainage ways of outwash plains and terraces. The soils formed in a loamy sand, lying over stratified sandy and gravelly outwash derived from a variety of acid rocks. Typically these soils have a 9 inch black mucky peat or very dark brown mucky sandy loamy surface layer. The subsurface layer from 9 to 16 inches is gray loamy sand. The substratum from 16 to 60 inches is olive gray, grayish brown and light yellowish brown loamy sand, loamy fine sand and coarse sand. The substratum may be stratified.

Walpole sandy loam (13). This series consists of deep, poorly drained soils formed in sandy water deposited glacial outwash materials. They are nearly level to gently sloping soils on glaciofluvial landforms, typically in shallow drainage ways and low-lying positions on stream terraces and outwash plains. The soils formed in loamy over stratified sandy and gravelly outwash derived from a variety of acid rocks. Typically, these soils have a very dark brown sandy loam surface layer 6 inches thick. The subsoil from 6 to 23 inches is mottled, grayish brown sandy loam. The substratum from 23 to 60 inches is mottled, light brownish gray, gravelly loamy sand and gravelly sand.

ON-SITE SOIL INVESTIGATION & WETLAND DELINEATION REPORT *(CONTINUED)*

PROJECT NAME & SITE LOCATION: +/- 73.02-acres (2 parcels)
Lake Road, Killingly, CT

SOIL MAP UNITS

Wetland Soils

Leicester fine sandy loam (3). This series, which is some Connecticut counties is found only in complex with the Ridgebury and Whitman series, consists of deep, poorly drained loamy soils formed in friable glacial till on uplands. They are nearly level to gently sloping soils in drainage ways and low lying positions on till covered uplands. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically, these soils have a surface layer of black fine sandy loam 6 inches thick. The subsoil from 6 to 23 inches is grayish brown, mottled fine sandy loam. The substratum from 26 to 60 inches or more is dark yellowish brown, mottled, friable, gravelly fine sandy loam.

Ridgebury fine sandy loam (3). This soil series consists of deep, poorly and somewhat poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level to moderately steep soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically these soils have a black sandy loam surface layer 6 inches thick. The mottled subsoil from 6 to 16 inches is olive gray sandy loam. The mottled substratum from 16 to 60 inches is a light olive brown and olive, very firm and brittle gravelly sandy loam.

Whitman fine sandy loam (3). This series, which is some Connecticut counties is only mapped in complex with the Ridgebury and Leicester series, consists of deep, very poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till on uplands. They are nearly level and gently sloping soils on till plains, low ridges and drumloidal landforms. The soils formed in acid glacial till derived mainly from schist, gneiss or granite. Typically these soils have a black fine sandy loam surface layer 8 inches thick. The mottled subsoil from 8 to 15 inches is gray sandy loam. The mottled substratum from 15 to 60 inches is firm, olive gray to gray dense glacial till.

Any accompanying soil logs and soil maps, and the on-site soil investigation narrative are in accordance with the taxonomic classification of the National Cooperative Soil Survey of the USDA Natural Resource Conservation Service, and with the Connecticut Soil Legend (DEP Bulletin No.5, 1983), as amended by USDA-NRCS. Jurisdictional wetland boundaries were delineated pursuant to the Connecticut General Statutes (CGS Sections 22a-36 to 22a-45), as amended. The site investigation was conducted and/or reviewed by the undersigned Registered Soil Scientist(s) [registered with the Society of Soil Scientists of Southern New England (SSSSNE) in accordance with the standards of the Federal Office of Personnel Management].

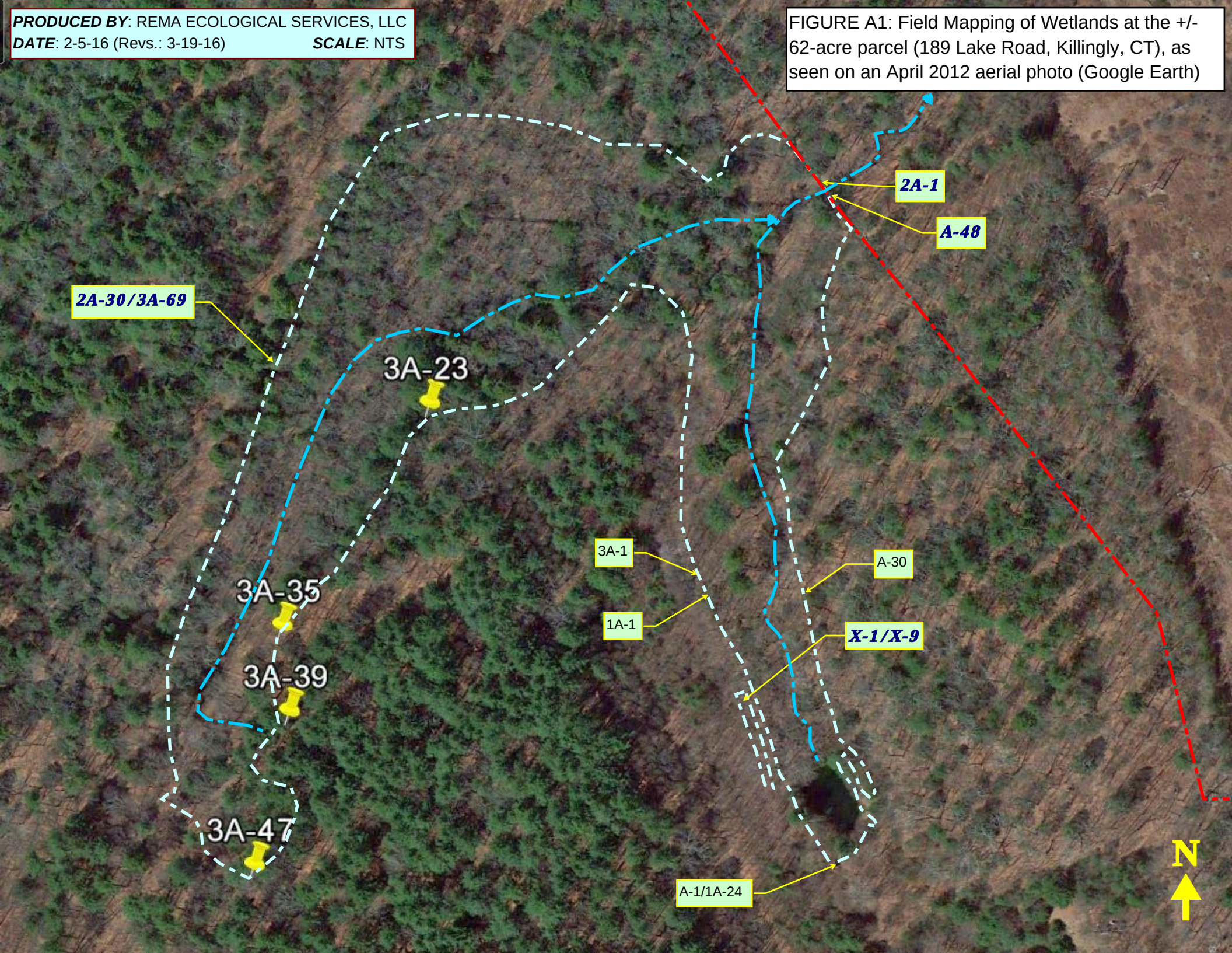
Respectfully submitted,

REMA ECOLOGICAL SERVICES, LLC

George T. Logan, MS, PWS, CSE
Registered Soil Scientist, Professional Wetland Scientist
Field Investigator/Senior Reviewer

PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 2-5-16 (Revs.: 3-19-16) ***SCALE***: NTS

FIGURE A1: Field Mapping of Wetlands at the +/- 62-acre parcel (189 Lake Road, Killingly, CT), as seen on an April 2012 aerial photo (Google Earth)



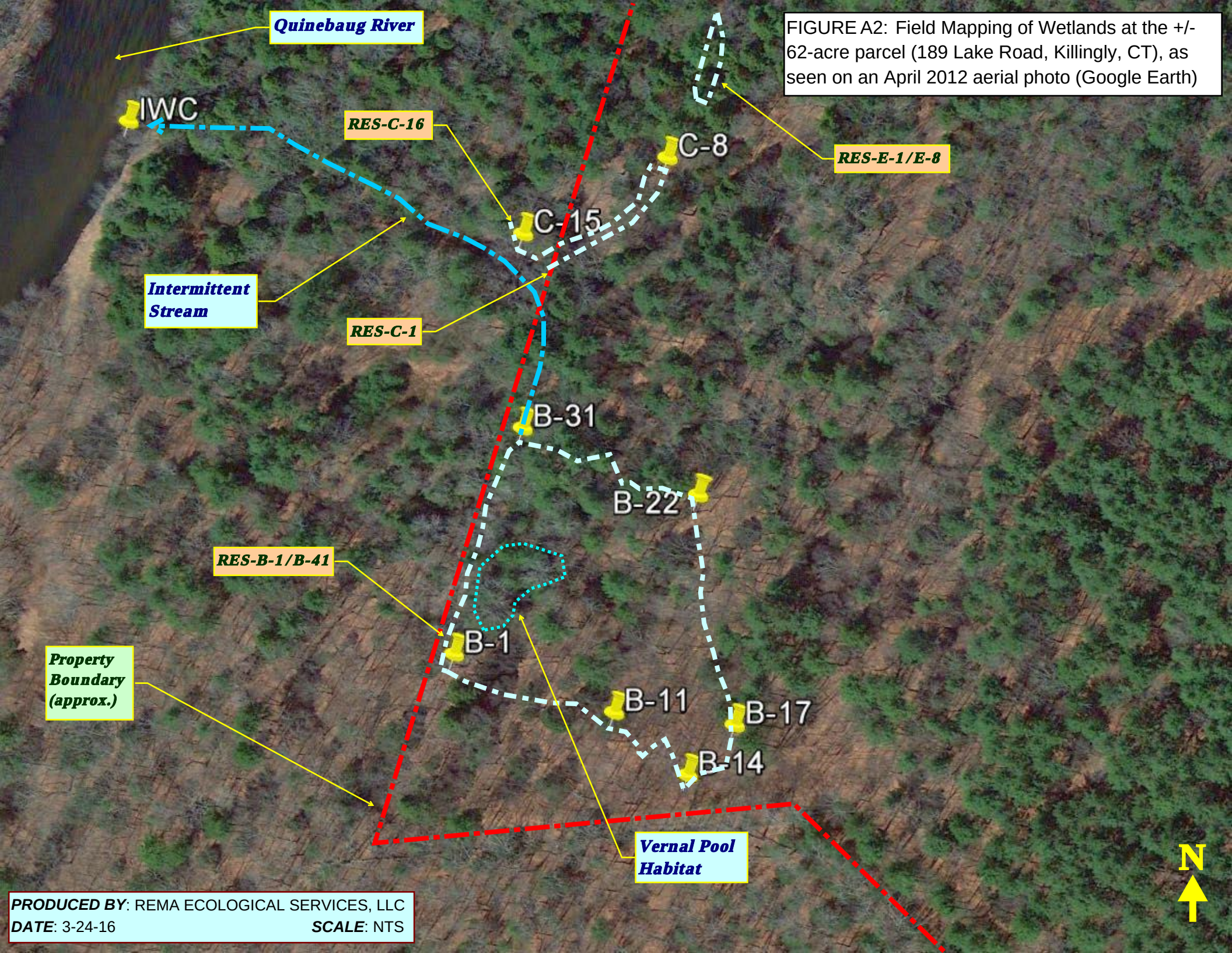
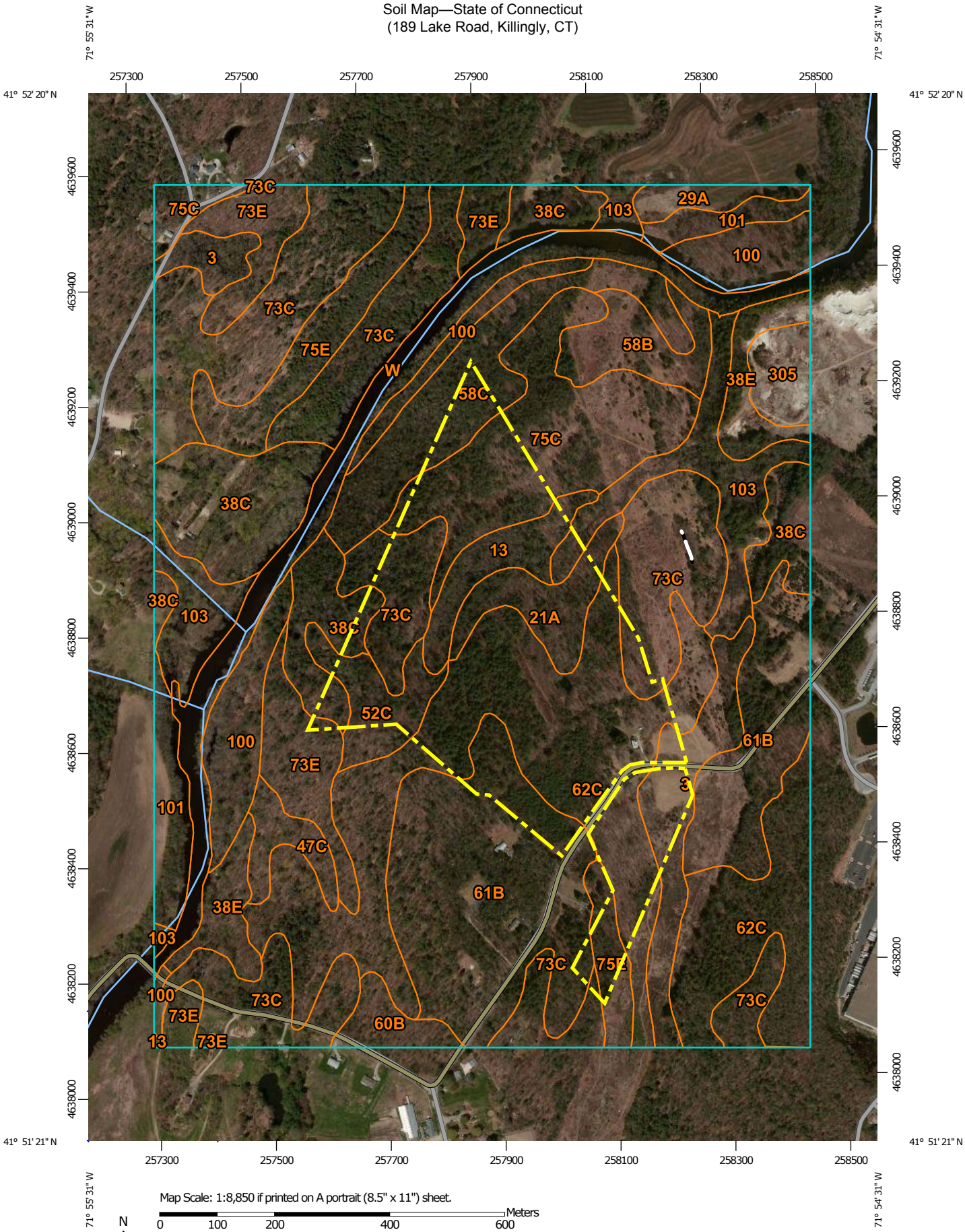


FIGURE A2: Field Mapping of Wetlands at the +/- 62-acre parcel (189 Lake Road, Killingly, CT), as seen on an April 2012 aerial photo (Google Earth)

PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 3-24-16 ***SCALE***: NTS

FIGURE A3: Field Mapping of Wetlands at the +/- 9.7-acre SE parcel (189 Lake Road, Killingly, CT), as seen on an April 2012 aerial photo (Google Earth)

Figure B:
Soil Map—State of Connecticut
(189 Lake Road, Killingly, CT)



Map Scale: 1:8,850 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 14, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	14.1	3.3%
13	Walpole sandy loam, 0 to 3 percent slopes	6.3	1.5%
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	7.0	1.7%
29A	Agawam fine sandy loam, 0 to 3 percent slopes	3.0	0.7%
38C	Hinckley loamy sand, 3 to 15 percent slopes	29.3	6.9%
38E	Hinckley loamy sand, 15 to 45 percent slopes	9.6	2.3%
47C	Woodbridge fine sandy loam, 3 to 15 percent slopes, extremely stony	4.0	0.9%
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	6.5	1.5%
58B	Gloucester gravelly sandy loam, 3 to 8 percent slopes, very stony	7.5	1.8%
58C	Gloucester gravelly sandy loam, 8 to 15 percent slopes, very stony	17.1	4.0%
60B	Canton and Charlton soils, 3 to 8 percent slopes	3.6	0.9%
61B	Canton and Charlton soils, 3 to 8 percent slopes, very stony	50.6	11.9%
62C	Canton and Charlton soils, 3 to 15 percent slopes, extremely stony	67.7	16.0%
73C	Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	67.1	15.8%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	18.2	4.3%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	27.8	6.6%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	14.2	3.3%
100	Suncook loamy fine sand	18.1	4.3%
101	Occum fine sandy loam	8.7	2.0%

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
103	Rippowam fine sandy loam	20.0	4.7%
305	Udorthents-Pits complex, gravelly	4.2	1.0%
W	Water	19.5	4.6%
Totals for Area of Interest		**423.8**	**100.0%**

Attachment B

Wetland Delineation & Characterization Field Forms

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	*Killingly Energy Center, 189 Lake Rd, Killingly*	**Wetland ID:**	**A1**
Inspection Dates:	*2/26/16 , 3/18/16 5/20/16, 6-2-16*	Wetland Flag Series:	*RES-A-1 to RES-A-11; RES-1A-13 to RES-1A-24*
Inspector(s):	*S. Gadwa & G. Logan*	NWI Classification Codes:[1]	**PUB, PEM1, PFO1**

Weather/Field Conditions:	*2-26 cold/overcast ; 5-20 & 6-2 sunny, fair*	Snow/Frost Depth:	*Ice cover on 2-2-16 only*
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☐ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope *(adjacent wetlands)*	☒ Groundwater Depression *(pond)*

NWI Classification

System:

☒ Palustrine pond<5' deep	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☐ Scrub Shrub	☒ Emergent
☒ Aquatic Bed	☒ Unconsolidated Bottom	☒ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous PFO1	☒ Needle-leaved evergreen PFO4	☒ Persistent (Emergent, E. shore)
☒ Non-persistent (S. shore)	☐ Sand	☐ Mud
☐ Other:_____, _____		

Wetland Hydrology

☐ Seasonally Flooded	☒ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☒ Saturated	☒ Permanently Flooded (dominant)

Watercourse Type

☐ Intermittent	☒ Perennial	☐ Tidal
Comments: *A perennial pond, technically a watercourse per CT statutes, fed by intermittent & perennial (saturated hydrology) groundwater discharge. It is man-made, up to 5' deep & associated with a well house.*		

Special Aquatic Habitats

☐ Vernal Pool *(ecological sink)*	☐ Bog	☐ Fen
Comments: *Presence of small mouth bass and other predators precludes reproduction of VP amphibians*		

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*

Wetland ID: **A1**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Aquents (308w) (pond was excavated)	☒	☐	PD, VPD	☐	☒
Leicester, Whitman, Ridgebury (3) (limited)	☐	☒	PD, VPD	☐	☒
Sutton (52)	☐	☒	MWD	☒	☒
	☐	☐		☐	☐
	☐	☐		☐	☐
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Red maple	Eastern hemlock	Black birch
	White pine		
SHRUBS:	Highbush blueberry	Japanese barberry	Spicebush
HERBS/MOSSES:	Blue Swamp violet	Sphagnum mosses	Skunk cabbage
	Tussock sedge	Fowl meadow grass	
	Bristly bedstraw	Bristly dewberry	EM rhizomatous sedge
	Marsh bedstraw	Lady fern	Jewelweed
	White Turtlehead (low)	Yellow pond lily	Duckweed
VINES:	Fox grape		

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Green frog	Bull frog	Spring peeper	Sp. salamander (egg masses)	Small mouth bass
Cray fish	Water scorpion	Snail	Water strider	amphipod
LA waterthrush	Barred owl	Wood duck	Garter snake	Brown snake
Catbird	Wood thrush			

Notes

This wetland ecological unit is a spring-fed pond excavated for recreational and drinking water purposes, taking advantage of extended groundwater at the surface or just below it at this location. Throughflow is good, and the pond outlet feeds a north-flowing seasonal stream (Unit A2). The pond has a maximum depth of five feet, and moderate nutrient levels, though a bloom of green algae in early spring obscured some amphibian egg masses. WA1 is partly shaded by trees, but also has emergent marsh cover type on the sunny southeastern shore. A 1' to 2' thick layer of soft, unconsolidated organics covers the hard bottom. The pond has a moderately large population of smallmouth bass, an indicator of very good water quality.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	Killingly Energy Center, 189 Lake Rd, Killingly	**Wetland ID:**	**A2**
Inspection Dates:	3-18-16, 5-20-16, 5-26-16	Wetland Flag Series:	RES-A-11 to A-48; 1A-1 to 1A-13; 3A-1 to 3A-13
Inspector(s):	G. Logan, S. Gadwa	NWI Classification Codes:[1]	**PFO1**

Weather/Field Conditions:	5-20 & 26 sunny, fair, low wind	Snow/Frost Depth:	n/a
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☒ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope	☐ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☐ Scrub Shrub	☐ Emergent
☐ Aquatic Bed	☒ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous PFO1	☒ Needle-leaved evergreen PFO4	☐ Persistent
☐ Non-persistent	☐ Sand	☐ Mud
☐ Other:_____, _____		

Wetland Hydrology

☒ Seasonally Flooded	☒ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☐ Saturated	☐ Permanently Flooded

Watercourse Type

☒ Intermittent	☐ Perennial	☐ Tidal

Comments: Intermittent outlet stream of pond, just 12-18" wide, also fed by groundwater discharge; rocky in upper portion (fill & till soils), then sandy. Seepage wetlands just below pond, west side & at far N. end.

Special Aquatic Habitats

☐ Vernal Pool	☐ Bog	☐ Fen

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*

Wetland ID: **A2**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Aquents (308W); near pond, in northern filled section, & short ditched stretch	☒	☐	PD, VPD	☐	☒
Leicester, Whitman, Ridgebury (3)	☒	☐	PD, VPD	☐	☒
Walpole sandy loam (13)	☒	☐	PD	☒	☒
Sutton (52)	☐	☒	MWD	☐	☒
Udorthents (308); old field to west	☐	☒	MWD	☐	☒
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Red maple (many pole size)	Eastern hemlock	Black birch
	Ironwood	Slippery elm	Yellow birch
	White pine	Red oak	
SHRUBS:	Highbush blueberry	Japanese barberry	Spicebush
	Sweet pepperbush	black birch (s)	
HERBS/MOSSES:	Blue Swamp violet	Sphagnum mosses	Skunk cabbage
	Bladder sedge	Jewelweed	Penn bittercress
	Bristly bedstraw	Follicled sedge	White swamp violet
	Marsh bedstraw	Royal fern	Cinnamon fern
	Hooked buttercup	Lady fern	Golden saxifrage
VINES:	Fox grape	Virginia creeper	

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Green frog	Phoebe	Wood frog	Deer	catbird
Barred owl	Two-lined salamander	Red-backed salamander	Wood thrush	cardinal

Notes

This wetland ecological unit occupies the forested east side of a gently sloping valley floor, bordered by a moderately sloping ridge to the east. It is fed by groundwater seepage, including the outlet stream of a spring-fed pond. Some filling took place in southern portion. Broadleaf trees predominate, and small "polesize" trees are dominant west of the corridor. Stream channel is braided in northern portion with an upland island. Water quality is excellent, with abundant mosses, and very low nutrient levels, based on testing for water quality. Banks are stable, not undercut or eroded, and flow occupies most of the channel bed (just 12-18" wide). Woody debris, including a large tree tip, is common at the north end. A broad (30 – 40 feet) swath of seasonally saturated forested wetland extends westerly from the stream; the eastern terrace is narrow.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	Killingly Energy Center, 189 Lake Rd, Killingly	**Wetland ID:**	**A3**
Inspection Dates:	5/4, 5/26, 6/4/16	Wetland Flag Series:	RES-3A-13 to 3A69; 2A-1 to 2A-30
Inspector(s):	G. Logan, S. Gadwa	NWI Classification Codes:[1]	**PFO1/4**

Weather/Field Conditions:	5-4-16 overcast, cold; 5-26-16 sunny, fair, low wind	Snow/Frost Depth:	
Soil Moisture:	☒ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☒ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope	☒ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☐ Scrub Shrub	☐ Emergent
☐ Aquatic Bed	☒ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous	☒ Needle-leaved evergreen	☒ Persistent
☐ Non-persistent	☒ Sand stream substrate, S. end	☒ Mud streambanks, deep shade
☐ Other:_____, _____		

Wetland Hydrology

☒ Seasonally Flooded	☒ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☒ Saturated	☐ Permanently Flooded

Watercourse Type

☒ Intermittent	☐ Perennial	☐ Tidal

Comments: This low-gradient watercourse joins WA2 near southern property line & flows offsite. Central portion flows through a broad (~60' wide) sunlit marsh. South end: a ~3' wide stream with defined banks

Special Aquatic Habitats

☐ Vernal Pool	☐ Bog	☐ Fen

Comments: Deepest pool, by a tree tip, centrally located (south of Wetland Flag 3A-67) is not deep enough or flooded long enough for wood frog breeding. Pickerel frog and spring peeper breeding probable.

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*

Wetland ID: **A3**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Walpole sandy loam (13) (dominant)	☒	☐	PD	☒	☒
Leicester, Whitman, Ridgebury (3)	☒	☐	PD, VPD	☐	☒
Scarboro muck (15)	☐	☒	VPD	☐	☒
Ninigret & Tisbury (21)	☒	☐	MWD	☒	☒
Canton & Charlton soils (62)	☐	☒	WD	☒	☒
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Red maple	Eastern hemlock	Black birch
	Ironwood	Red oak	Yellow birch
	White pine		
SHRUBS:	Highbush blueberry	Japanese barberry	Spicebush
	Red maple (s)	Birch (s)	Winterberry
HERBS/MOSSES:	Cinnamon fern	Tussock sedge	Skunk cabbage
	Sphagnum mosses	Jewelweed	Marsh bedstraw
	Bristly dewberry	Canada mayflower	Blue swamp violet
	Dwarf ginseng	Wood anemone	Star flower
	Bladder sedge	Sedges (spp.)	Tall meadow rue
VINES:	Poison ivy	Virginia creeper	

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Pickerel frog	Green frog	Spring peeper	Gray tree frog	Veery
Barred owl	Catbird	Deer	Coyote	Red squirrel
LA waterthrush	Two-lined salamander	Wood frog		

Notes

This wetland ecological unit is a broad wetland on the west side of the central valley, with a broad swath of hemlock forest, and moderate microtopography. A moderate-height ridge lies to the west with rock outcrops (and abandoned quarry). The wetland intercepts a sub-regional groundwater table, and contains sizable marshy areas along the eastern section of stream, with very poorly drained organics, saturated year round. Plants besides Sphagnum patches are sparse under deep hemlock shade. The seasonal (semi-perennial) stream originates at a cistern/spring and has been ditched through the entire length of the swamp, likely in the late 1800s or early 1900s. The cistern contains a sizeable population of mayflies.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	Killingly Energy Center, 189 Lake Rd, Killingly	**Wetland ID:**	**B**
Inspection Dates:	3-18, 5-20, 5-26, & 6-4-16	Wetland Flag Series:	RES-B-1 to B-41
Inspector(s):	G. Logan S. Gadwa	NWI Classification Codes:[1]	**PFO1/4**

Weather/Field Conditions:	5-20 & 26 sunny, fair, low wind	Snow/Frost Depth:	
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☐ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope	☒ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☐ Scrub Shrub	☐ Emergent
☐ Aquatic Bed	☒ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous PFO1	☒ Needle-leaved evergreen PFO4	☐ Persistent
☐ Non-persistent	☐ Sand	☒ Mud
☐ Other:_____, _____		

Wetland Hydrology

☒ Seasonally Flooded	☒ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☐ Saturated	☐ Permanently Flooded

Watercourse Type

☒ Intermittent	☐ Perennial	☐ Tidal
Comments: A ditched outlet stream carries outflow off-site to the Quinebaug River		

Special Aquatic Habitats

☒ Vernal Pool	☐ Bog	☐ Fen
Comments: A seasonally flooded portion of wetland supports breeding of spotted salamander, wood frog, spring peeper, and gray tree frog (possibly pickerel frog)		

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*

Wetland ID: **B**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Sutton fine sandy loam (52)	☐	☒	MWD	☒	☒
Leicester, Ridgebury, Whitman (3)	☒	☐	PD, VPD	☐	☒
Hinckley loamy sand (38C)	☒	☐	EWD	☒	☒
Charlton-Chatfield complex (73)	☐	☒	WD	☒	☒
	☐	☐		☐	☐
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Red maple	Eastern hemlock	Black birch
	Ironwood	Slippery elm	Black willow
	White pine	Green ash	
SHRUBS:	Spicebush	Japanese barberry	Winterberry
	Nannyberry		
HERBS:	Sensitive fern	Cinnamon fern	Skunk cabbage
	False nettle	Jewelweed	Fowl meadow grass
	Wood anemone	Dwarf ginseng	Bristly dewberry
	Canada mayflower	Hay-scented fern	Cinnamon fern
	Jack-in-the pulpit	New York fern	Partridgeberry
VINES:	Poison ivy		

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Wood thrush	Red-eyed vireo	Ovenbird	Gray tree frog	Sp. salamander
Wood frog	White tailed deer	White-footed mouse	Spring peeper	
Phoebe	Raven (flyover)	Red-shouldered hawk		

Notes

Wetland Unit B encompasses a seasonally saturated, densely vegetated, rocky slope on the east side of the wetland, dominated by spicebush, and a depressional area with several pools and extended soil saturation, supporting lush herbs. The deepest pool is a small vernal pool with over 30 inches of organics. On the northern & eastern periphery is seasonally saturated hemlock forest with sparse herbs. WB discharges northerly into a small north-flowing stream (ditched). Tree tips and moss-covered large woody debris are abundant. Surface flows are piped to this wetland along its southwestern edge from a wood road.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project: Killingly Energy Center, 189 Lake Rd, Killingly		**Wetland ID:**	C
Inspection Dates: 5-26-16	Wetland Flag Series: WL		
Inspector(s): G. Logan, S. Gadwa	NWI Classification Codes:[1]		PFO1

Weather/Field Conditions:	5-26 sunny, fair, low wind	Snow/Frost Depth:	
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☒ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope	☐ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☒ Scrub Shrub (along swale)	☐ Emergent
☐ Aquatic Bed	☒ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous PFO1	☒ Needle-leaved evergreen PFO4	☐ Persistent
☐ Non-persistent	☐ Sand	☐ Mud
☐ Other:_____, _____		

Wetland Hydrology

☒ Seasonally Flooded	☐ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated (swale)	☐ Saturated	☐ Permanently Flooded

Watercourse Type

☒ Intermittent	☐ Perennial	☐ Tidal

Comments: At western terminus joins intermittent outlet stream of Wetland Unit B, just 12-18" wide, and 1-2" deep. Stream is incised up to two feet, shaded by hemlocks, with minimal riparian vegetation. Vegetated feeder swale (i.e. Wetland C) joins the stream from the east.

Special Aquatic Habitats

☐ Vernal Pool	☐ Bog	☐ Fen

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*
Wetland ID: C

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Leicester, Ridgebury, Whitman (3)	☒	☐	PD, VPD	☐	☒
Hinckley loamy sand (38)	☐	☒	ED	☒	☒
Sutton fine sandy loam (52)	☐	☒	MWD	☒	☒
Chatfield- Charlton sandy loam (62)	☐	☒	WD	☒	☒
	☐	☐		☐	☐
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Eastern hemlock	Red maple	Black birch
	Red oak	Black oak	White pine
SHRUBS:	Hemlock (s)	Japanese barberry	Birch (s)
	Spicebush	Highbush blueberry	
HERBS/MOSSES:	Skunk cabbage	Cinnamon fern	Canada mayflower
	Christmas fern	Wood ferns	Jack-in-the-pulpit
	Violets	New York fern	Sensitive fern
	Sphagnum mosses		
VINES:	Virginia creeper		

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Gray tree frog	ovenbird	Wood thrush	Red-eyed vireo	deer
Raccoon				

Notes

Wetland Unit C is a narrow, small, mostly high-gradient, seasonal seepage wetland that exits the hemlock forest on the west side of the site and continues off-site towards the Quinebaug River, along an intermittent watercourse that originates in Wetland B. The sandy soil in glaciofluvial deposits near the river allows water to soak in quickly, limiting moisture levels and development of hydrophytic vegetation along the watercourse.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	Killingly Energy Center, 189 Lake Rd, Killingly	**Wetland ID:**	**D**
Inspection Dates:	5-26-16	Wetland Flag Series:	RES-D-1 to D-26
Inspector(s):	G. Logan, S. Gadwa	NWI Classification Codes:[1]	**PFO1/4**

Weather/Field Conditions:	5-26 sunny, fair, low wind	Snow/Frost Depth:	
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☒ Surface Water Slope	☐ Surface Water Depression
☒ Groundwater Slope	☐ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☐ Forested	☒ Scrub Shrub	☒ Emergent
☐ Aquatic Bed	☐ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous	☐ Needle-leaved evergreen	☒ Persistent
☒ Non-persistent	☐ Sand	☐ Mud
☐ Other:_____, _____		

Wetland Hydrology

☐ Seasonally Flooded	☐ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☐ Saturated	☐ Permanently Flooded

Watercourse Type

☐ Intermittent	☐ Perennial	☐ Tidal
Comments:		

Special Aquatic Habitats

☐ Vernal Pool	☐ Bog	☐ Fen

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*
Wetland ID: **D**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Ridgebury (2)	☒	☐	PD	☐	☒
Walpole sandy loam (13)	☒	☐	PD	☐	☒
Sutton fine sandy loam (52)	☐	☒	MWD	☐	☒
Chatfield- Charlton sandy loam (62)	☐	☒	WD	☒	☒
	☐	☐		☐	☐
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES/SAPLINGS:	White Pine	Red maple	Green ash
	Black cherry		
SHRUBS:	Glossy buckthorn	Willows	Morrow's honeysuckle
	Autumn olive	Highbush blueberry	N. arrowwood
	Steeplebush	Meadowsweet	Multiflora rose
HERBS/MOSSES:	Roughstem goldenrod	Poison ivy	Bedstraw
	Common cinquefoil	Golden alexanders	Sensitive fern
	Royal fern	New York fern	Asters
	Grasses	Sedges	Madder
	Blue-eyed grass	Deer tongue	
VINES:	Poison ivy	Asiatic bittersweet	Fox grape

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Gray tree frog	Prairie warbler	Field sparrow	American robin	Yellow warbler
Indigo bunting	Yellow-throated vireo	Towhee	Broad-wing. hawk	Turkey
Crow	Common yellowthroat	Garter snake	Milk snake	Red-tld. Hawk
Cardinal	R. thr. Hummingbird	Deer	Meadow-jump. Mouse	Raven (flyover)

Notes

Wetland Unit D is the western portion of a larger wetland complex that occurs off-site within the Eversource electric right of way. It is a mosaic of scrub shrub and emergent wetland. Soils are derived from a sandy deposit within a till dominated landform. Spodic horizons were observed with a rudimentary iron pan. Some disturbance due to past agricultural activities is present, and invasive species, particularly glossy buckthorn, are locally dominant, and spreading.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLAND DELINEATION & CHARACTERIZATION FIELD FORM

Project:	Killingly Energy Center, 189 Lake Rd, Killingly	**Wetland ID:**	E
Inspection Dates:	5-26-16	Wetland Flag Series:	RES-E-1 to E-8
Inspector(s):	G. Logan, S. Gadwa	NWI Classification Codes:[1]	PFO1/4

Weather/Field Conditions:	5-26 sunny, fair, low wind	Snow/Frost Depth:	
Soil Moisture:	☐ Wet	☒ Moist	☐ Dry
Type of Wetland Delineation:	☒ State	☒ Federal	☐ Other

HGM Classification

☒ Surface Water Slope	☐ Surface Water Depression
☐ Groundwater Slope	☐ Groundwater Depression

NWI Classification

System:

☒ Palustrine	☐ Lacustrine	☐ Riverine	☐ Estuarine

Class:

☒ Forested	☐ Scrub Shrub	☐ Emergent
☐ Aquatic Bed	☐ Unconsolidated Bottom	☐ Unconsolidated Shore

Subclass:

☒ Broad-leaved deciduous	☒ Needle-leaved evergreen	☐ Persistent
☐ Non-persistent	☐ Sand	☐ Mud
☐ Other:_____, _____		

Wetland Hydrology

☒ Seasonally Flooded	☐ Temporarily Flooded	☐ Semi-permanently Flooded
☒ Seasonally Saturated	☐ Saturated	☐ Permanently Flooded

Watercourse Type

☐ Intermittent	☐ Perennial	☐ Tidal
Comments:		

Special Aquatic Habitats

☐ Vernal Pool	☐ Bog	☐ Fen

[1] The wetland unit could include more than one cover type. The dominant cover type is first.

Wetland Delineation & Characterization Field Form *(continued):* ***Project:*** *KEC*

Wetland ID: **E**

Mapped Soil Series/Units

Soil Series (Map Unit Symbol)	WET	UP	DRAINAGE CLASS	NRCS MAPPED	FIELD CONFIRMED
Ridgebury (2)	☒	☐	PD	☐	☒
Hinckley loamy sand (38)	☐	☒	ED	☒	☒
Sutton fine sandy loam (52)	☐	☒	MWD	☒	☒
Chatfield- Charlton sandy loam (62)	☐	☒	WD	☒	☒
	☐	☐		☐	☐
	☐	☐		☐	☐

ED=excessively drained; SED=somewhat excessively drained; WD=well drained; MWD=moderately well drained; SPD=somewhat poorly drained; PD=poorly drained; VPD=very poorly drained

Observed Plants[2]

TREES:	Eastern hemlock	Red maple	Black birch
	White pine	Red oak	
SHRUBS:	Hemlock (s)	Japanese barberry	
HERBS/MOSSES:	Violets	Poison ivy	Bedstraw
	Christmas fern	Wood ferns	Jack-in-the-pulpit
	Starflower	New York fern	Asters
	Grasses	Cinnamon fern	
VINES:	Poison ivy		

Observed Wildlife & Wildlife sign *(within wetland or nearby):*

Gray tree frog	Scarlet tanager	Wood thrush	Red-eyed vireo	deer

Notes

Wetland Unit E is a very small and isolated shallow depressional area that receives surface flows from the surrounding forest. It overflows down a moderately steep slope to Wetland C, which flows off-site via an intermittent stream to the Quinebaug River. The overflow is a broad and shallow swale that does not qualify as an intermittent watercourse.

[2] Dominant plant species are underlined. Invasive species are double underlined. (s) = saplings

WETLANDS: *The Physical Environment*

WETLAND HYDROGEOMORPHIC CLASSIFICATION

Surface-Water Depression Wetlands: In these wetlands, precipitation and overland flow (surface runoff) collect in a depression where there is little or no groundwater discharge. Water leaves the wetland principally by evaporotranspiration and infiltration (groundwater recharge). The wetland hydrologic system lies above the local or regional groundwater system and is isolated from it by an unsaturated zone; thus, it is said to be "perched." In the glaciated Northeast, surface-water depression wetlands are most likely to form over bedrock or till deposits in topographically elevated areas of landscape; however, they may develop in lowland kettles or ice-block basins that formed in glaciolacustrine or fine-textured glaciofluvial deposits.

Surface-Water Slope Wetlands: These wetlands are located along the edge of stream or lake or on the sloping surface of a floodplain. They may occur on till or stratified drift but are commonly found on alluvium. While precipitation and overland flow also feed these wetlands, the principal source of water is the overflow of the adjacent water body. The sloping surface of the wetland permits water to drain readily back to the lake or river as its stage falls. As was the case with the previous class, the wetland surface usually lies well above the local water table, so groundwater discharge to the wetland is negligible or nonexistent. Groundwater recharge from the wetland is possible, depending on the permeability of underlying surficial deposits.

Groundwater Depression Wetlands: These wetlands occur where a basin intercepts the local groundwater table, so that groundwater discharge as well as precipitation and overland flow feed the wetland. Classic groundwater depression wetlands have no surface drainage leaving the site; however, occasional streamflow out may occur form basin overflow. Groundwater inflow may be continuous or seasonal, depending upon the depth of the basin and the degree of fluctuation of the local water table. During periods when the wetland water level is higher than the local groundwater table (e.g., after major precipitation events in dry season), groundwater recharge may occur. Groundwater may enter the wetland basin from all directions, or it may discharge in one area and recharge in another. In the glaciated Northeast, groundwater depression wetlands are most likely to occur in stratified drift, particularly in coarse-textured glaciofluvial deposits where relatively rapid movement between groundwater and surface water can occur.

Groundwater Slope Wetlands: These wetlands occur where groundwater discharges as springs or seeps at the land surface and drains away as streamflow. Most commonly, these wetlands occur on hillsides over till deposits or at the base of hills where stratified drift and till come into contact. Headwater wetlands are typically groundwater slope wetlands. The local water table slopes toward the wetland surface. Where groundwater flow is continuous, the soil remains saturated. At many sites, however, groundwater inputs cease during late summer or early fall as evaporotranspiration depletes soil moisture in the root zone, in which case the soil is only seasonally saturated. Permanent ponding of water is prevented by the sloping land surface, but water may collect temporarily in isolated depressions. Precipitation and overland flow provide additional water to the wetland on an intermittent basis. Groundwater recharge may occur in the wetland after such events, but amounts are likely to be negligible, especially where wetland soils have formed over dense lodgment till deposits. Where such deposits are present, groundwater slope wetlands may be fed primarily by shallow groundwater systems perched above the regional system.

Reference:

Golet, C.G., A.J.K. Calhoun, W.R. DeRagon, D.J. Lowry, and A.J. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. USFWS. Biological Report No. 12

WETLANDS: *The Physical Environment*

SOIL DRAINAGE CLASSES

Excessively drained: Brightly colored; usually coarse-textured; rapid permeability; very low water-holding capacity; subsoil free of mottles

Somewhat excessively drained: Brightly colored; rather sandy; rapid permeability; low water-holding capacity; subsoil free of mottles

Well drained: Color usually bright yellow, red, or brown; drain excess water readily, but contain sufficient fine material to provide adequate moisture for plant growth; subsoil is free of mottles to a depth of at least 36 inches.

Moderately well drained: Generally any texture, but internal drainage is restricted to some degree; mottles common in the lower part of the subsoil, generally at a depth of 18 to 36 inches; may remain wet and cold later in spring; generally suited for agricultural use.

Somewhat poorly drained: Remain wet for long periods of time due to slow removal of water; generally have a slowly permeable layer within the profile or a high water table; mottles common in the subsoil at a depth of 8 to 18 inches.

Poorly drained: Dark, thick surface horizons commonly; gray colors usually dominate subsoil; water table at or near the surface during a considerable part of the year; mottles frequently found within 8 inches of the soil surface.

Very poorly drained: Generally thick black surface horizons and gray subsoil; saturated by high water table most of the year; usually occur in level or depressed sites and are frequently ponded with water.

Reference:

Wright, W. R., and E. H. Sautter. 1979. Soils of Rhode Island landscapes. R.I. Agric Exp. Station Bull. 429. 42 pp.

WETLANDS: *The Physical Environment*

COMMON WATER REGIMES OF NORTHEASTERN WETLANDS

Seasonally flooded: Surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.

Temporarily flooded: Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season.

Seasonally saturated: The soil is saturated to the surface, especially early in the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is absent except for groundwater seepage and overland flow.

Semi-permanently flooded: Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

Permanently flooded: Water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes.

Saturated: The substratum is saturated to the surface for extended periods during the growing season, but surface water is seldom present. This water regime applies to permanently saturated, non-flooded wetlands such as bogs.

References:

Golet, F. C., A. J. K. Calhoun, W. R. DeRagon, D. J. Lowry and A. J. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U. S. Dep. Int. Fish Wild. Serv. Biol. Rep. 12, 152 pp.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Fish Wild. Serv. Biol. Serv. Program FWS-OBS 79/31. 103 pp.

Attachment C

Annotated Photographs

Wetland/Watercourse Resources associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to June 2016, by REMA Ecological Services, LLC

Photo A1-1: Wetland A1; man-made pond; 6-13-16; facing northwesterly

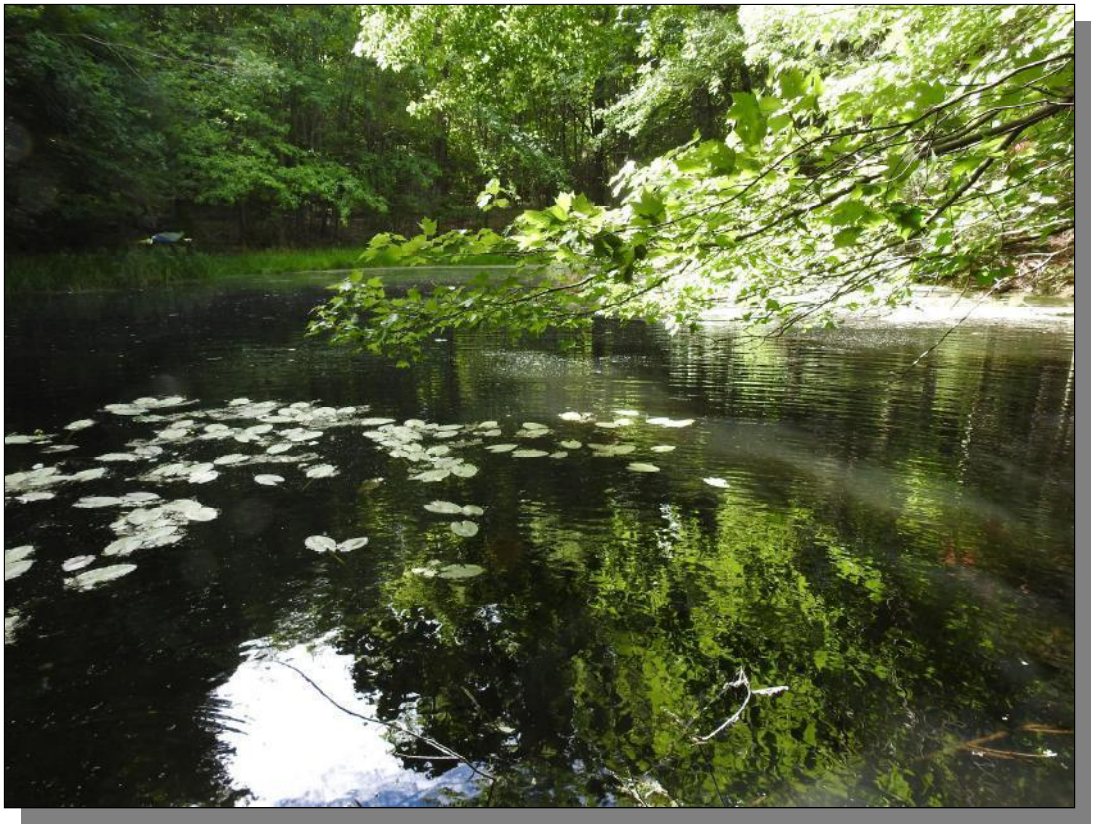


Photo A1-2: Man-made pond from earthen embankment; 6-10-16; facing southeasterly

Photo A1-3: Wetland A1; pump house and spring overflowing to man-made pond; 3-11-16; facing southeasterly

Photo A1-4: Man-made pond overflow to Wetland A2; from earthen embankment; 4-13-16; facing southwesterly

Photo A2-1: Wetland A2; semi-perennial stream and wetland corridor; 3-11-16; facing northwesterly

Photo A2-2: Wetland A2, lower portion on sandy soils; looking across wetland corridor; 3-11-16; facing westerly

Photo A2-3: Wetland A2; semi-perennial stream; upper portion on till soils; 5-26-16; facing southerly

Photo A2-4: Wetland A2, lower portion on outwash soils; 6-10-16; facing northerly

Photo A3-1: Wetland A3; seasonally flooded to saturated evergreen and deciduous wetland; 3-1-16; facing southerly

Photo A3-2: Wetland A3, semi-perennial stream outlet at property boundary; 3-11-16; facing northerly

Photo A3-3: Wetland A3; cistern at spring at the headwaters of the wetland's watercourse; 3-18-16; facing westerly

Photo A3-4: Wetland A3, cistern at wetland's spring; 6-10-16; facing easterly

Photo A3-5: Wetland A3; central section; 5-4-16; facing southwesterly

Photo A3-6: Wetland A3, southern section along channelized watercourse; 4-13-16; facing southwesterly

Photo A3-7: Wetland A3; watercourse within swamp; 5-20-16; facing southwesterly

Photo A3-8: Wetland A3, southern section; understory (background) dominated by tussock sedge; 6-10-16; facing easterly

Wetland/Watercourse Resources associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to June 2016, by REMA Ecological Services, LLC

Photo B-1: Wetland B; seasonally saturated to flooded wooded swamp; central section; 4-13-16; facing northerly

Photo B-2: Wetland B, northern section; 5-26-16; facing southeasterly

Photo B-3: Wetland B; seasonally flooded area with 3+ feet of organics; an embedded vernal pool habitat; central section; 3-24-16; facing northeasterly

Photo B-4: Wetland B, central section; 5-26-16; facing northeasterly

Photo B-5: Wetland B; northwesterly extent; outlet stream forms at stone wall; also surface water quality sampling station; 4-26-16; facing northeasterly

Photo B-6: Wetland B, outlet intermittent stream at property boundary, flowing towards the Quinebaug River; facing northwesterly

Photo C-1: Wetland C; seasonally saturated hillside seep; discharges to Wetland B's outlet stream off-site; 5-26-16; facing northeasterly

Photo C-2: Wetland C, top of delineated wetland; 5-26-16; facing southwesterly

Photo D-1: Wetland D; seasonally saturated scrub-shrub/emergent wetland (complex); northern section; 5-26-16; facing southerly

Photo D-2: Wetland D, emergent section up against eastern site boundary and Eversource ROW; 5-26-16; facing southeasterly

Photo D-3: Wetland D; central section; 5-26-16; facing southwesterly

Photo E-1: Wetland E; seasonally saturated forested wetland pocket; 4-13-16; facing northeasterly

Photo E-2: Wetland E, a heavily shaded wetland pocket; 5-26-16; facing southwesterly

Photo X-1: Wetland X; seasonally saturated, disturbed wetland, along cleared woods road, just west of Wetland A-3; 3-18-16; facing northerly

Photo X-2: Wetland X, a narrow, disturbed wetland; 3-24-16; facing southeasterly

Attachment D

Surface Water Quality Sampling

Table A. Surface water analytical results for two samples taken on 3-11-16 at the NTE Generating Facility, 189 Lake Road, Killingly, Connecticut: *Station #1A* , 5 feet upgradient of the outlet of a man-made farm pond (Wetland A1); *Station #1B* , about 200 feet downstream of the pond outlet, in WA2.

Sampling Stations:	*Station #1A (WA1)*	*Station #1B (WA2)*	*CT Standards*
Sampled on 3-11-16	Pond just above dam	Stream +/-200' below pond	
Sampling Time:	3:10 PM	5:29 PM	
Conductivity (µ S/cm)	81.1	91.0	NE
pH	6.40	6.63	NE
Salinity (PPT)	0.1	ND	NE
Temperature *(degrees C)*	11.6	ND	as naturally occurs[1]
Total Phosphorus as P (µg/l)	0.03	0.02	only of natural origin[1], 23[2]
Ortho Phosphorus as P (µg/l)	0.01	<0.01	NE
Nitrate-N + nitrite-N (mg/l)	0.35	0.21	0.31[2] (includes Nitrite-N)
Ammonia (mg/l)	0.08	0.09	1.9[3] (chronic)
Total Kjeldahl Nitrogen (mg/l)	0.39	0.30	5[1]; 1.26[2]
Total Nitrogen (mg/l)	0.74	0.51	0.56[2]

NOTES:

N/A = Not applicable

NE = No standard established

mg/L = milligrams per Liter; µg/L = micrograms per Liter

[1] The State of Connecticut Water Quality Standards for Class A Waters.

[2] USEPA Nutrient Criteria (draft) for EcoRegion IV, Level 11 Ecoregion 59 (coastal New England).

[3] USEPA Freshwater Ambient Criteria (chronic toxicity) (2013); @ pH 7.0, Temp. 20°C

Table B. Surface water analytical results for three samples taken on 5-4-16 at the NTE Generating Facility Site, 189 Lake Road, Killingly, Connecticut: *Station #1A* , 5 feet upgradient of the outlet of an excavated farm pond (Wetland A1); *Station #2* , just past the confluence of two un-named Intermittent streams, Wetlands A2 & A3; and *Station #3* , the outlet stream for Wetland B at northwestern section of site.

Sampling Stations:	*Station #1 (WA1)*	*Station #2 (WA1& 2)*	*Station #3 (WC)*	*CT Standards*
Sampled on 5-4-16	Pond just above dam	Confl., Stream A1 & A2	Outlet Stream of WB	
Sampling Time:	2:29 PM	3:01 PM	3:44 PM	
Conductivity (µS/cm)	50.5	49.8	21.4	NE
pH	6.70	6.78	6.60	NE
Salinity (PPT)	0.0	0.0	0.0	NE
Temperature *(degrees C)*	11.1	9.6	9.4	as naturally occurs[1]
Total Phosphorus as P (µg/l)	0.04	0.10	0.06	only of natural origin[1], 23.00[2]
Ortho Phosphorus as P (µg/l)	0.01	0.02	<0.01	NE
Nitrate-N + nitrite-N (mg/l)	0.12	0.22	0.01	0.31[2] (includes Nitrite-N)
Ammonia (mg/l)	<0.05	<0.01	0.10	1.9[3] (chronic)
Total Kjeldahl Nitrogen (mg/l)	0.34	0.67	0.49	5[1]; 1.26[2]
Total Nitrogen (mg/l)	0.46	0.89	0.50	0.56[2]

NOTES:

N/A = Not applicable

NE = No standard established

mg/L = milligrams per Liter; µg/L = micrograms per Liter

[1] The State of Connecticut Water Quality Standards for Class A Waters.

[2] USEPA Nutrient Criteria (draft) for EcoRegion IV, Level 11 Ecoregion 59 (coastal New England).

[3] USEPA Freshwater Ambient Criteria (chronic toxicity) (2013); @ pH 7.0, Temp. 20°C

Note that the Total Nitrogen parameter is the sum of other nitrogen paramters; it is often used for stream assessments.

PHOENIX
Environmental Laboratories, Inc.

Thursday, March 17, 2016

Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Project ID: 189 LAKE ROAD KILLINGLY
Sample ID#s: BK77815 - BK77816

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Telephone (860) 645-1102 Fax (860) 645-0823

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

March 17, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:	SG	03/11/16	15:10
Location Code:	REMA	Received by:	SW	03/11/16	17:29
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBK77815
Phoenix ID: BK77815

Project ID: 189 LAKE ROAD KILLINGLY
Client ID: STATION 1 POND

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Conductivity	113	5.00	umhos/cm	1	03/12/16	RWR/KDB	SM2510B-97
Ammonia as Nitrogen	0.08	0.05	mg/L	1	03/16/16	WHM	E350.1
Nitrite-N	0.01	0.01	mg/L	1	03/11/16 20:25	CAL	E353.2
Nitrate-N	0.34	0.02	mg/L	1	03/11/16 20:25	CAL	E353.2
Ortho-Phosphate-P	0.01	0.01	mg/L	1	03/11/16 19:32	CAL	SM4500PF-99
pH	6.42	0.10	pH Units	1	03/12/16 00:23	RWR/KDB	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.39	0.10	mg/L	1	03/16/16	WHM	E351.1
Total Nitrogen	0.74	0.10	mg/L	1	03/16/16	WHM	SM4500NH3/E300.0
Phosphorus, as P	0.03	0.01	mg/L	1	03/15/16	MA	SM4500PE-99

Project ID: 189 LAKE ROAD KILLINGLY
Client ID: STATION 1 POND

Phoenix I.D.: BK77815

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

Ortho-Phosphate was not field filtered within 15 minutes of collection.

Total Phosphorus:
This sample was received with a pH>2. The EPA requires preservation at time of sampling to a pH of <2. A sample bias can not be ruled out.

Ammonia:
This sample was received with a pH>2 The EPA requires preservation at time of sampling to a pH of <2. A sample bias can not be ruled out.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
March 17, 2016
Reviewed and Released by: Deb Lawrie, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

March 17, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:	SG	03/11/16	14:30
Location Code:	REMA	Received by:	SW	03/11/16	17:29
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBK77815
Phoenix ID: BK77816

Project ID: 189 LAKE ROAD KILLINGLY
Client ID: STATION 2 STREAM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Conductivity	91	5.00	umhos/cm	1	03/12/16	RWR/KDB	SM2510B-97
Ammonia as Nitrogen	0.09	0.05	mg/L	1	03/16/16	WHM	E350.1
Nitrite-N	< 0.01	0.01	mg/L	1	03/11/16 20:26	CAL	E353.2
Nitrate-N	0.21	0.02	mg/L	1	03/11/16 20:26	CAL	E353.2
Ortho-Phosphate-P	< 0.01	0.01	mg/L	1	03/11/16 19:36	CAL	SM4500PF-99
pH	6.63	0.10	pH Units	1	03/12/16 00:25	RWR/KDB	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.30	0.10	mg/L	1	03/16/16	WHM	E351.1
Total Nitrogen	0.51	0.10	mg/L	1	03/16/16	WHM	SM4500NH3/E300.0
Phosphorus, as P	0.02	0.01	mg/L	1	03/15/16	MA	SM4500PE-99

Project ID: 189 LAKE ROAD KILLINGLY
Client ID: STATION 2 STREAM

Phoenix I.D.: BK77816

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

Ortho-Phosphate was not field filtered within 15 minutes of collection.

Total Phosphorus:
This sample was received with a pH>2. The EPA requires preservation at time of sampling to a pH of <2. A sample bias can not be ruled out.

Ammonia:
This sample was received with a pH>2 The EPA requires preservation at time of sampling to a pH of <2. A sample bias can not be ruled out.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
March 17, 2016
Reviewed and Released by: Deb Lawrie, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

March 17, 2016

QA/QC Data

SDG I.D.: GBK77815

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 337837 (mg/L), QC Sample No: BK77090 (BK77815, BK77816)													
Ortho-Phosphate-P	BRL	0.01	0.06	0.07	15.4	101			96.1			85 - 115	20
QA/QC Batch 338038 (mg/L), QC Sample No: BK77110 (BK77815, BK77816)													
Ammonia as Nitrogen	BRL	0.05	0.10	0.10	NC	107			97.5				
Nitrogen Tot Kjeldahl	BRL	0.10	0.38	0.41	NC	99.4			102				
QA/QC Batch 338010 (mg/L), QC Sample No: BK77304 (BK77815, BK77816)													
Phosphorus, as P	BRL	0.01	5.06	4.99	1.40	106			106			85 - 115	20
QA/QC Batch 337868 (umhos/cm), QC Sample No: BK77538 (BK77815, BK77816)													
Conductivity	BRL	5.00	762	762	0	104						85 - 115	20
QA/QC Batch 337856 (pH), QC Sample No: BK77538 (BK77815, BK77816)													
pH			7.89	7.81	1.00	98.9						85 - 115	20
QA/QC Batch 337840 (mg/L), QC Sample No: BK77588 (BK77815, BK77816)													
Nitrate-N	BRL	0.02	1.38	1.39	0.70	102			120			85 - 115	20
Nitrite-N	BRL	0.01	0.12	0.13	8.00	103			86.5			85 - 115	20

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
March 17, 2016

Thursday, March 17, 2016

Criteria: None

State: CT

Sample Criteria Exceedences Report

GBK77815 - REMA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

CHAIN OF CUSTODY RECORD

PHOENIX Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Cooler: Yes [✓] No [ ]
Coolant: IPK [✓] ICE [ ] N [ ]
Temp 15 °C Pg of

Residential Drinking Water Test

Customer: Conca Ecological Services, LLC
Address: 183 Guinevere Rd, Cheshire, CT 06410

Address where sample was collected: Foster Residence Killingly, CT

Phone #: 2033371869
Fax #: Sigrani.Gadwa@sbcglobal.net

Client Sample - Information - Identification
Sampler's Signature: S. N. Gadwa Date: ______

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
SE=Sediment SL=Sludge S=Soil/Solid W=Wipe O=Other

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Conductivity	pH	TP	Orthophosphorus	TN	Nitrate+Nitrite	Ammonia		Soil VOA Vials	GL Soil container	GL Soil container	40 ml VOA Vial	GL Amber 1000ml	PL As is [X] 250ml	PL H2SO4 250ml/500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle
~~Fish pond~~ 77815	Station 1 Pond	SW	3-11-16	3:10	X	X	X	X	X	X	X							X				
77816	Station 2 - stream	SW	3-11-16	2:30pm	X	X	X	X	X	X	X							X				

Relinquished by:	Accepted by:	Date:	Time:
S. N. Gadwa	B. Olivera 3/11/16 17:29	3-11-16	5:25pm

Comments, Special Requirements or Regulations:

Turnaround:
- [ ] 1 Day*
- [ ] 2 Days*
- [ ] 3 Days*
- [X] Standard
- [ ] Other

* SURCHARGE APPLIES

~~Ice down or keep samples @ 2-5°C (35-41°F)~~

~~Samples should be delivered to the lab within 12 hours (24 hours max) from time of sampling~~

~~Drinking Water Analysis List~~
~~The report will include the following analysis:~~

pH	Color	Sulfate
Hardness	Odor	Iron & Manganese
Chloride	Turbidity	Coliform Bacteria
Sodium	Nitrite & Nitrate	Chlorine

PHOENIX
Environmental Laboratories, Inc.

Friday, May 13, 2016

Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Project ID: NTE-KILLINGLY
Sample ID#s: BN25553 - BN25555

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Telephone (860) 645-1102 Fax (860) 645-0823

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 13, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:	GH	05/04/16	14:29
Location Code:	REMA	Received by:	DL	05/04/16	18:10
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBN25553
Phoenix ID: BN25553

Project ID: NTE-KILLINGLY
Client ID: STATION #1 - POND

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Ammonia as Nitrogen	< 0.05	0.05	mg/L	1	05/12/16	WHM	E350.1
Nitrate-Nitrite (N)	0.12	0.01	mg/L	1	05/05/16	GD	E353.2
Ortho-Phosphate-P	0.01	0.01	mg/L	1	05/05/16 00:49	GD	SM4500PF-99
pH	6.73	0.10	pH Units	1	05/05/16 04:51	RR/EG	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.25	0.10	mg/L	1	05/12/16	WHM	E351.1
Phosphorus, as P	0.04	0.01	mg/L	1	05/09/16	JR	SM4500PE-99

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

Ortho-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
May 13, 2016
Reviewed and Released by: Deb Lawrie, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 13, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:	GH	05/04/16	15:01
Location Code:	REMA	Received by:	DL	05/04/16	18:10
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBN25553
Phoenix ID: BN25554

Project ID: NTE-KILLINGLY
Client ID: STATION #2 - OUTLET STREAM

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Ammonia as Nitrogen	< 0.10	0.10	mg/L	2	05/12/16	WHM	E350.1
Nitrate-Nitrite (N)	0.22	0.01	mg/L	1	05/05/16	GD	E353.2
Ortho-Phosphate-P	0.02	0.01	mg/L	1	05/05/16 00:50	GD	SM4500PF-99
pH	6.78	0.10	pH Units	1	05/05/16 04:53	RR/EG	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.67	0.20	mg/L	2	05/12/16	WHM	E351.1
Phosphorus, as P	0.10	0.01	mg/L	1	05/09/16	JR	SM4500PE-99

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

Ortho-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
May 13, 2016
Reviewed and Released by: Deb Lawrie, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 13, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SURFACE WATER	Collected by:	GH	05/04/16	15:44
Location Code:	REMA	Received by:	DL	05/04/16	18:10
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBN25553
Phoenix ID: BN25555

Project ID: NTE-KILLINGLY
Client ID: STATION #3 - WETLAND B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Ammonia as Nitrogen	0.10	0.05	mg/L	1	05/12/16	WHM	E350.1
Nitrate-Nitrite (N)	0.01	0.01	mg/L	1	05/05/16	GD	E353.2
Ortho-Phosphate-P	0.01	0.01	mg/L	1	05/05/16 00:51	GD	SM4500PF-99
pH	6.14	0.10	pH Units	1	05/05/16 04:55	RR/EG	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.49	0.10	mg/L	1	05/12/16	WHM	E351.1
Phosphorus, as P	0.06	0.01	mg/L	1	05/09/16	JR	SM4500PE-99

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

Ortho-Phosphate was not field filtered within 15 minutes of collection.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
May 13, 2016
Reviewed and Released by: Deb Lawrie, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

May 13, 2016

QA/QC Data

SDG I.D.: GBN25553

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 344503 (pH), QC Sample No: BN25265 (BN25553, BN25554, BN25555)													
pH			8.10	8.30	2.40	98.5						85 - 115	20
QA/QC Batch 344459 (mg/L), QC Sample No: BN25269 (BN25553, BN25554, BN25555)													
Ortho-Phosphate-P	BRL	0.01	0.07	0.06	15.4	99.4			90.5			85 - 115	20
QA/QC Batch 344828 (mg/L), QC Sample No: BN25647 (BN25553, BN25554, BN25555)													
Phosphorus, as P	BRL	0.01	0.73	0.74	1.40	105			101			85 - 115	20
QA/QC Batch 344586 (mg/L), QC Sample No: BN26060 (BN25553, BN25554, BN25555)													
Nitrate-N	BRL	0.02	0.09	0.08	NC	106			101			85 - 115	20
QA/QC Batch 345123 (mg/L), QC Sample No: BN29080 (BN25553, BN25554, BN25555)													
Ammonia as Nitrogen	BRL	0.05	0.23	0.23	NC	94.7			97.7			85 - 115	20
Nitrogen Tot Kjeldahl	BRL	0.10	1.83	1.83	0	91.7			77.0			85 - 115	20

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
May 13, 2016

Criteria: None

State: CT

Sample Criteria Exceedences Report

GBN25553 - REMA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Comments

May 13, 2016 SDG I.D.: GBN25553

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes [X] No [ ]
Coolant: IPK [ ] ICE [X] No [ ]

PHOENIX
Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Temp 7 °C Pg of

Contact Options:
[ ] Fax:
[ ] Phone:
[X] Email: REMA8@AOL.COM

Customer: REMA ECOLOGICAL SERVICES, LLC
Address: 164 EAST CENTER ST., SUITE 8
MANCHESTER, CT 06040

Project: NTE-KILLINGLY
Report to: REMA
Invoice to: "

Project P.O:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 5-4-16

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe
OIL=Oil **B**=Bulk **L**=Liquid

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	pH	TKN	NO2+NO3	TP	ORTHO-P	AMMONIA-N	Soil VOA Vials [ ] methanol [ ] H2O	GL Soil container ( ) oz	GL Soil container ( ) oz	40 ml VOA Vial [ ] As is [ ] HCl	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml	PL H2SO4 [ ] 250ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle
25553	STATION #1 - POND	SW	5-4-16	2:29p	X	X	X	X	X	X						1	1	1		
25554	STATION #2 - OUTLET STREAM	SW	"	3:01p	X	X	X	X	X	X						1	1	1		
25555	STATION #3 - WETLAND B	"	"	3:44p	X	X	X	X	X	X						1	1	1		

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	5-4-16	6:10p

Comments, Special Requirements or Regulations:
Please filter H_2SO_4 & HNO_3 samples of organic debris

Turnaround:
[ ] 1 Day*
[ ] 2 Days*
[ ] 3 Days*
[X] Standard
[ ] Other
* SURCHARGE APPLIES

RI
[ ] Direct Exposure (Residential)
[ ] GW
[ ] Other

CT
[ ] RCP Cert
[ ] GW Protection
[ ] SW Protection
[ ] GA Mobility
[ ] GB Mobility
[ ] Residential DEC
[ ] I/C DEC
[ ] Other

MA
[ ] MCP Certification
[ ] GW-1
[ ] GW-2
[ ] GW-3
[ ] S-1
[ ] S-2
[ ] S-3
[ ] MWRA eSMART
[ ] Other

State where samples were collected: _____

Data Format
[ ] Excel
[X] PDF
[ ] GIS/Key
[ ] EQuIS
[ ] Other

Data Package
[ ] Tier II Checklist
[ ] Full Data Package*
[ ] Phoenix Std Report
[ ] Other

* SURCHARGE APPLIES

APPENDI F – SPECIES INFORMATION

F-1 Ecological Assessment Report
F-2 Invertebrate Survey
F-3 Bat Monitoring Survey Results
F-4 Agency Correspondence

APPENDI F-1 – ECOLOGICAL ASSESSMENT REPORT

ECOLOGICAL ASSESSMENT REPORT

KILLINGLY ENERGY CENTER

LAKE ROAD, KILLINGLY, CONNECTICUT

August 2016

Killingly Energy Center
an NTE Energy Project

REMA

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Attachment B. Annotated Photographs
Attachment C. Vegetative Inventory
Attachment D. Breeding Bird Survey
Attachment E. Wildlife Inventory

1.0 INTRODUCTION

NTE Connecticut, LLC (NTE) plans to develop the Killingly Energy Center (KEC), an approximately 550-megawatt combined cycle electric generating facility and related electrical interconnection switchyard on an approximately 73-acre site in Killingly, Connecticut (the KEC Site). Approximately 63 acres north of Lake Road will be the location of the generating facility (the Generating Facility Site), and the approximately 10-acre parcel south of Lake Road (the Switchyard Site) will be the location of the associated utility switchyard.

This *Ecological ssessment Report* presents the results of the site-wide inventory of habitats, flora, and fauna, conducted by REMA Ecological Services, LLC (REMA). Specifically, this report describes the various vegetative cover types at the KEC Site, and presents inventory lists of flora and fauna (see Attachments C and E). While wetland and watercourse resources, and their vegetative cover types, are not described in detail in this document,[1] amphibian surveys at the site's man-made pond (i.e., Wetland Unit A1) and at the amphibian breeding pool (a.k.a. vernal pool habitat) embedded within Wetland Unit B are presented and the results discussed in view of the proposed development (see Section 4.0).

Breeding bird studies were conducted at the site using a point census method (see Section 5.0), and targeted searches for two "Connecticut-listed" reptiles, the eastern box turtle (*errapene c. carolina*) and the wood turtle (*Glyptemys insculpta*), were also conducted. The avian, amphibian, and reptile surveys, as well as our observations of mammals utilizing the site's habitats were combined into a master wildlife inventory (see Attachment E). Targeted searches for "Connecticut-listed" lepidopterans (i.e., two moth species and a butterfly), were also conducted. The results of that survey, while briefly mentioned and discussed herein, are submitted separately.[2]

Site visits for the purpose of natural resource surveys at the site commenced on February 4, 2016 and were completed on August 3, 2016. Two REMA staff, and one associate, with expertise in botany, wildlife, and entomology logged in excess of 114 hours in the field during the aforementioned nearly six-month period.

---

[1] A detailed description and inventory of the site's regulated wetlands and watercourses can found in our *Wetlands Report: Existing Conditions*, dated July 2016, and submitted separately.
[2] See Final Report: Invertebrate Survey, dated August 2016.

2.0 PROJECT OVERVIEW

The project area encompasses roughly 73 acres of mostly undeveloped land in Killingly, Connecticut. The site is located west of Alexander Lake and Interstate 395, and few hundred feet south and east of the Quinebaug River (see Figure 1, Attachment A). An Eversource electric transmission right-of-way abuts the site to the south east.

NTE Connecticut, LLC is seeking approvals to develop the Killingly Energy Center (KEC), an approximately 550-MW combined cycle electric generating facility and related electrical interconnection switchyard. At the Generating Facility Site the proposal calls for the disturbance of about 24 acres of mostly wooded uplands. At the Switchyard Site, proposed development will result in the disturbance of approximately 4 acres of land including post-agricultural land and an open field.

3.0 ECOLOGICAL COMMUNITIES

3.1 Regional Context

The Town of Killingly is located within the *Northern ills Central ardwoods White Pine one* of the *Northeast ills Ecoregion* (Dowhan and Craig 1976).[3] An ecoregion is:

> *"An area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern and the presence or absence of certain indicator species and species groups."*

This interior ecoregion has minimal coastal influence. Bedrock is primarily metamorphic, complexly folded into north-trending belts. Elevations within the region are over 400 feet above mean sea level (asml). Eastern hemlock (*suga canadensis*) and white pine (*Pinus strobus*) are important evergreen forest constituents, and forests also include many oaks (*uercus* sp.) and hickories (*Carya* sp.).

[3] Dowhan, J.J. and R.J. Craig. 1976. Rare and endangered species of Connecticut and their habitats. Natural Resources Center, Dept. of Environmental Protection, 137 p.

3.2 Upland Vegetative Cover Types

Plant communities can be classified into *cover types* at any particular site, by considering plant species composition and site characteristics on a scale large enough to integrate minor differences. Whitlock et al. (1994) define a *cover type* as follows:

> *"A portion of a wetland or upland system that contains a uniform plant community composition and structure or that is influenced by one hydrologic regime. distinct change in either hydrologic or vegetation characteristics indicates a change in cover types*." (Emphasis added.)

The cover type approach of ecosystem classification is well-suited to use as a rapid method of *habitat* survey. This method assumes that *vegetation structure* is a key factor influencing the type of fauna that a vegetation community is able to support. The vegetative *cover types* associated with the overall site are described below.

The upland cover type section complements the narrative already submitted (June 2016) describing cover types in each of the wetland units (i.e., Wetland Units A1, A2, A3, B, C, D, E, and X), and the site's location and landscape setting. This report begins by describing the upland cover types (habitats) used by wildlife on the site. The following report sections present and discuss the results of the pond and vernal pool surveys, the avian and herptile surveys, and general wildlife surveys and assessments of the site. The attachments include vegetative cover type figures, inventories for fauna and flora, as well as selected photographs.

3.2.1 pland Cover Type Descriptions

Upland cover type descriptions include vegetation structure, plant species composition, soil properties, and other habitat features such as rock outcrops or woody debris. Each cover type is depicted in the A series of the annotated photo-record (see Attachment B). The locations of the cover type units are shown in Figure 2 (see Attachment A). The base map for this figure is an April 2016 aerial photo.

Topographic maps, and summer aerial photographs, were also used to draw cover type boundaries on the map. The 12 mapping units are listed below in Table 1. The letters in the labels for the cover type units on the map correspond to basic categories of vegetation structure (G for grassland, S for shrubland/sapling thicket, and F for Forest).

This is the same type of system used by the Natural Wetland Inventory (NWI) System, and by Metzler and Barrett (2006) in *he egetation of Connecticut, Preliminary Classification.* Modifiers are abbreviations for dominant species, community maturity, or an important habitat feature. They may be combined. For example *Fo* is the map code for oak-dominated upland forest. *Feo* is the code for a mixed evergreen-hardwood forest, with oaks as the dominant hardwood.

Table 1: Dominant Upland Vegetative Cover Types at KEC Site

Classification	Cover Type Description	Cover Type Mapping Unit*
Grassland	Moist, managed field	**UGm**
	Successional field	**UGs**
	Dry field	**UGd**
Shrub/Sapling Thicket	Deciduous thicket	**USd**
	Evergreen sapling thicket	**USe**
	Japanese knotweed stand	**USj**
Upland Forest	Immature hardwood forest	**UFi**
	Moist deciduous forest	**UFm**
	Moist hemlock forest	**UFmh**
	Highland hemlock forest	**UFh**
	Oak forest	**UFo**
	Moist evergreen-oak forest	**UFeo**

See Figure 2 (ttachment)

The vegetation inventory (see Attachment C) includes all plant species observed and identified, primarily on May 20, May 26, and July 21, 2016. The inventory also indicates whether a species is invasive, and whether it occurs in wetlands or uplands, in forest, shrubland, or grassland. Each species is also assigned to a broad abundance category. Vegetation data were collected predominately by REMA plant ecologist Sigrun Gadwa, supplemented by observations made by ecologist/wildlife biologist George Logan, during avian and herpetological surveys.

Inventory intensity was sufficient to characterize cover types, but some of the late-blooming asters and grasses could not be identified to species. Within large apparently homogeneous upland areas survey routes were spaced far enough apart that infrequent species could have been missed. However, inventory intensity was much more robust

in the areas of the proposed development both on the Generating Facility Site and the Switchyard Site, and less in the areas that would be protected, such as the northwestern ridgeline in the Generating Facility Site or the southern forested section of the Switchyard Site.

3.2.1.1 Grasslands

The grassland cover type currently occupies a small proportion of the site, less than five percent of the site's 73 acres, although the proportion was much higher in the past when the site was actively farmed, based on review of archived aerial photographs. For instance, the 1990 aerial shows roughly 11 acres of the Generating Facility Site and roughly 3.5 acres of the Switchyard Site being open, non-forested habitat. Abandonment of agriculture in most of these areas took place in the early to mid-1980s, except for the two grassy fields, described below, which are still mowed.

Mapping nit Gm The two fields on either side of Lake Road, have been regularly maintained by mowing, and soils are level and moist (see Photos A-1, A-2, and A-11 and A-2, Attachment B). The USDA-NRCS soils map does not split the upland field soils out from the adjacent wetland mapping unit. Vegetation is dense and grasses are dominant, including orchard grass (*Dactylis glomerata*), timothy (*Phleum pretense*), deer tongue grass (*Dichanthelium clandestinum*), fescues (*Festuca* sp.) and bent grasses (*grostis* sp.). Grasses are intermixed with European madder (*Rubia tinctorum*), common cinquefoil (*Potentilla simplex*), Queen Anne's lace (*Daucus carota*), daisy fleabane (*Erigeron annuus*), common milkweed (*sclepias syriaca*), and clovers (*rifolium* sp.).

South of Lake Road, first year seedlings of woody species are also present, along the field edges and some in the field interior as well: white meadowsweet (*Spiraea alba*), black cherry (*Prunus serotine*), white ash (*Fraxinus americana*), and red maple (*cer rubrum*), and autumn olive (*Elaeagnus umbellata*). The field east of the existing house on the Generating Facility Site is mowed more often, but does have some pasture juniper (*uniperus communis*). Along field edges, rough-stem (*Solidago rugosa*), tall (*S. altissima*), and grass-leaved goldenrod (*S. graminifolia*), St. John's wort (*ypericum perforatum*), some golden alexander (*izia aurea*), and white vervain (*erbena urticifolia*) are also present, along with seedlings of invasive Asiatic bittersweet (*Celastrus orbiculatus*) and desirable shade-intolerant shrubs. No yellow-

glooming false indigo (*aptisia tinctoria)* was observed, the host plant for several state-listed insect species, including the Frosted Elfin (*Callophrys irus*), a butterfly listed as "Threatened." However, two milk snakes (*Lampropeltis riangulum*) were observed in the southern field.

Mapping nit Gs This successional grassland cover type is dominated by forbs rather than grasses (see Photos A-5). The west-most field south of Lake Road, is savannah-like. Expanses of dense, clonal wrinkle-leaved goldenrod (*Solidago rugosa*) grow among low-density clonal, immature black locust trees (*Robinia pseudoacacia*). Minor herbs and vines include common milkweed, white vervain, deer tongue grass, motherwort (*Leonurus cardiaca*), and cow vetch (*icia cracca*), clovers, golden alexander (*izia aurea*), and virgin's bower (*Clematis virginiana*). Few woody seedlings are becoming established in the stand of dense goldenrod.

Mapping nit Gd A non-forested, grassy cover type also occupies much of the dry, infertile hillside between the existing house and the pond (see Photos A-3 and A-4). Fine bladed fescues and bent grasses are dominant, but in portions of these clearings have mats of *Polytrichum* moss, patches of bare soil, and drought-tolerant herbs like Canada cinquefoil (*Potentilla canadensis*), hawkweed (*ieracium* sp.), and plantain-leaved pussy toes (*ntennaria plantaginifolia*), but no false indigo (*aptisia tinctoria).* Small insect and mammal burrows were observed in bare soil, and the remains of a turquoise Calosoma beetle (a caterpillar hunter).

3.2.1.2 <u>Shrublands and Sapling Thickets</u>

This successional cover type has developed both north and south of Lake Road as farming operations ceased in a given field, but occupies less than 15 percent of the KEC site. Dense woody thickets, very difficult for people to move through, have a deeply shaded, sparse herb stratum. Three types are readily separated: *Sd* (broad-leaf deciduous) and *Se* (dominated by evergreens, mostly white pine. *Sj* is a monoculture of Japanese knotweed (*Fallopia japonica*) (technically a 2- to 3- meter tall herb), without any low herb stratum, found southerly of stone-walled barn at the Switchyard Site. Although multiflora rose (*Rosa multiflora*) thickets are widespread in Connecticut, this thorny invasive rose is not common at this site, although it occurs in low abundance in the southern portion of Wetland Unit A2. Thickets provide nesting

and feeding habitat for songbirds, especially those with palatable leaves and ample foliage insects. Catbirds were the most common bird in this cover type.

Mapping nit Sd Both north and south of Lake Road and next to the fields, soils are moist and fertile (see Photos A-7, A-8 and A-16). Thickets of tall shrubs occupy adjacent former fields. They are dominated by invasive glossy buckthorn (*Frangula alnus*), Morrow's honeysuckle (*Lonicera morrowii*), and autumn olive, intermixed with some native spicebush (*Lindera benzoin*), *highbush blueberry (accinium corymbosum), and saplings of red maple, black locust (Robinia pseudoacacia*), and black cherry *(Prunus serotina*). Vine cover is high, with both Asiatic bittersweet and fox grape (*itis labrusca*) present.

The small suite of shade-tolerant herb species is typical of early successional woody communities with moist soil: Swann's sedge (*Carex swanii*), bristly dewberry (*Rubus hispidus*), white avens (*Geum canadense*), Virginia creeper (*Parthenocissus uin uefolia*), bittersweet and Japanese barberry (*erberis* thunbergii) seedlings, common sorrel, stunted rough-stem goldenrod, occasional garlic mustard (*lliaria petiolata*), and sensitive fern (*noclea sensibilis*) (adjacent to wetland).

North of Lake road, a deciduous woody thicket borders the residential site yard to the west. It does not include buckthorn, but autumn olive and black cherry saplings are both dominants. Saplings of black birch (*etula lenta*) and red maple are also locally common. Asiatic bittersweet is well established and is overwhelmingly dominant in the sparse herb stratum. Deciduous thicket occurs as a mosaic with white pine thicket on the abandoned fields in this area, north of Lake Road.

Mapping nit Se The upland evergreen thicket, is a very low diversity cover type of closely spaced white pine saplings, occupying and abandoned agricultural field in the southwestern section of the Generating Facility Site (see Photos A-13 and A-14). There are many dead branches due to insufficient light. Some trees are pole-size but the overall structure is that of a dense thicket. White pine can seed into idle fields, and form a dense stand of seedlings which matures into an overly dense sapling stand. Soil acidity is higher than in the deciduous thickets, and woody debris is common, lying on the ground, a food source for assorted fungi. Herb cover is sparse. Canada mayflower (*Maianthemum canadense*) is one species that can tolerate ground-level conditions in this cover type. Evergreen thickets do have value for the cover they provide to birds and mammals during inclement weather.

Mapping nit Sj Japanese knotweed, thrives in the moist, fertile well-drained soil of the former farm fields, south of Lake Road (i.e., Switchyard Site), and has spread to occupy over 2,000 square feet (see Photos A-11 and A-12). Also, the beginning of a knotweed stand was observed between the residential yard and the field to the east, but it only occupies about 100 square feet at this time, and is not yet dense. The extent to which this species excludes other herbs and tree and shrub seedlings is a major reason for its priority invasive status. However, because it tolerates partial shade, it is closely associated with mature sugar maples and the woody other species described for the thicket cover type. Japanese knotweed stands are a productive nectar source in late summer, and do provide dense cover for species such as snakes.

3.2.1.3 Upland Forests

The forest cover type occupies more than 80% of the site. Red maple swamp is a major forest type, already discussed in the *Wetlands Report: Existing Conditions* (June 2016). Aside from species composition, factors separating the different forest types include soil moisture levels, depth to bedrock, and land use history (time since last logging). Several tree species, like black birch and red maple, are common in multiple forest types. Others are indicator species for a particular community, such as eastern hemlock.

Mapping nit Fm: Lowland forest occupies moist, moderately well-drained soils on the lower slopes of the site's prominent ridges, and adjacent to each of the three wetland systems north of Lake Road (i.e., Wetland Units A2, A3, and B) (see Photos A-20, through A-22). Along Lake Road it also occurs in hedgerows bordering the moist fields or thickets (former fields). Hedgerows include widely spaced sugar maples, white ashes, and shagbark hickories (*Carya ovata*). Valuable habitat features of hedgerows include a few large trees (dens/shelter for bats and other mammals). Old stone walls, and piles of old barn siding or other farm debris, also provide cover for wildlife, including snakes (e.g., brown snake).

Within forests this cover type has a suite of characteristic tree species, including sugar maple (*cer saccharum*), red maple, shagbark hickory, and black birch, as well as understory trees: ironwood, witch hazel (*amamelis virginiana*), shadbush (*melanchier* sp.), and pagoda dogwood (*Cornus alternifolia*). Red oak, pin oak (. *palustris*), and green ash (*Fraxinus pennsylvanica*) are also occasional. White pine and

hemlock seedlings and small saplings may be common in the understory. At this site, this cover type consists mostly of moderate to small-size trees, under 14 inches diameter-at-breast height (DBH), for example, along the edges of Wetland Unit A2.

Ferns are typically dominant in the herb stratum, hay-scented fern (*Dennstaedtia punctilobula)* and New York fern (*helypteris noveboracensis*). The forest floor of second growth forest also has assorted other herbs, like fragrant_bedstraw (*Galium trifidum*), sedges in the "laxi" tribe (Laxiflorae), partridgeberry (*Mitchella repens*), woodland oat grass (*Danthonia spicata*), Jack-in-the-pulpit (*risaema triphyllum*), and dwarf ginseng (*Panax trifolius*). Patches of fine-bladed Penn sedge (*Carex pensylvanica*) also grow in some forests, like the western hillside, south of Lake Road. This community is closest to the "sugar maple – New York fern" community described by Metzler and Barrett (2006) in the *egetation of Connecticut, Preliminary Classification*. Uncommon herb species are often found in this cover type, but not at this site, where level to gently sloping, fertile soils had mostly been farmed in the past.

Mapping nits Fo and Feo Oak is the dominant deciduous tree genus on the drier hillsides. All four common species are present, northern red (*uercus rubra*), black (. *velutina)*, white (. *alba*), and scarlet (. *coccinea*). Black birch is also common in this community, and shadbush (*melanchier* sp.) is occasional. Some stands consist largely of deciduous trees, mapped as *Fo* (see Photos A-23 through A-26), whereas others are mixed oak and evergreen (mostly white pine) and are mapped as *Feo* (see Photos A-27 through A-30). Oaks are only of moderate size elsewhere, on the mid to upper slopes of the eastern and western ridges; they were likely logged in the past, and used as pasture until the early 1900s.

A mature example of this mixed white pine-oak (*Feo*) community occupies the upper slopes of the central hill, between Wetland Units A1/A2, to the east and Wetland Unit A3, to the west. Another mature example of mixed white pine-oak forest occurs on the crest of the western ridge, within the Generating Facility Site, intermixed with hemlock, especially in the sapling stratum.

In the understory of an oak or mixed oak-white pine forest, a suite of ericaceous species (mountain laurel [*Kalmia latifolia*], pink azaleas [*Rhododendron periclymenoides*], huckleberry [*Gaylussacia baccata*], and several low-bush blueberry [*accinium* sp.]) is expected. They do all occur at this site, but are sparser than in

many sites. Species in the sparse herb stratum include spotted wintergreen (*Chimaphila maculata*), Penn sedge, and a few other unidentified sedges, hayscented fern (*Dennstaedtia punctilobula*), Canada mayflower, and Christmas fern (*Polystichum acrostichoides*), and a small panic grass (*Dicanthelium dichotomum*). The understory and herb stratum of a mixed oak-white pine stand is low to moderate in density. In addition to the understory species listed above, white pine saplings are important in the shrub stratum. The hillsides and flat summits supporting these cover types were logged and perhaps grazed in the past. In the *egetation of Connecticut, Preliminary Classification* (Metzler and Barrett 2006) the closest description is that for the *"Northern red oak, black oak, blue ridge blueberry community"*

Mapping nit Fmh When mature hemlock is dominant in a lowland forest, as it is on the broad terrace to the west of Wetland Unit A3 (Generating Facility Site), the mapping unit is labeled *Fmh* (see Photo A-32). This is because light levels are lower, and acidic hemlock needles cover the ground, creating a more acidic soil. Herbaceous cover is moderately high, and species include cinnamon fern (*smunda cinnamomea*), star flower (*rientalis borealis*), Canada mayflower, several clubmosses (*Lycopodium* sp.), and bristly dewberry. Red oak, red maple, and white pine commonly grow within lowland hemlock stands.

Mapping nit Fh Another cover type dominated by Northern hemlock occupies drier, higher elevation soil on the far western side west side of the site, including some rock outcrops and portions of the summit, as well as upper slopes, and the northwestern plateau (see Photos A-31 and A-33). Oaks and white pine are associated to varying degrees. In areas where hemlock forest forms a dense monoculture, there is little understory other than hemlock seedlings and saplings, but in gaps between the evergreens, the same ferns and wildflowers appear as in the *Fo* unit, described below. Star flower is characteristic.

On a few partly shaded boulders and outcrops, common polypody and evergreen wood fern (*Dryopteris intermedia*) were noted, Penn sedge patches were occasional, and a few forest wildflowers in the lily family were noted: Solomon's seal (*Polygonatum* sp.); false Solomon's seal (*Maianthemum racemosum*); and Canada mayflower. Overhangs, crevices, and cliff faces are in themselves habitat features of this cover type, too widely dispersed to map separately, but important for fauna and for mosses and lichens. Where the bedrock is acidic and crystalline, as it is at this site, the

Connecticut Department of Energy and Environmental Protection (CTDEEP) classifies sunny open rock outcrops as critical habitats, but not shaded rocky habitats (this is in contrast to rocky habitats on sub-acidic basalt or limestone rocks, which are classified as critical habitats). The low herbaceous diversity observed on the shaded outcrops of the eastern and western ridges is consistent with this cover type not meeting the classification criteria for a critical habitat.

Mapping nit Fi This cover type consists of immature forest, at the "pole" stage, with trees under 8 inches in diameter, growing in areas that were fields 30 years ago (e.g., per the 1986 CTDEEP aerial photo), such as the rectangular area to the west of Wetland Unit A2 (see Photos A-17). Most stands have a relatively uniform structure, with most trees the same age. The herb stratum is similar to that described for the thicket cover type, with laxi sedges (*Carex plantaginea*), Swann's sedge, white avens, Virginia creeper, garlic mustard, and hay-scented fern. Red maples and black birches are dominant because they are efficient colonizers of fields, but sugar maple, and oaks and white pines are present as well. The proportion of invasives is much lower in the immature forests in the northern portion of the site, than in the thicket cover type, near Lake Road at the Generating Facility Site. The moist, immature forest at the base of the northwestern hill (the location of the cemetery) also has few invasive shrub and vine species.

3.3 Discussion

From a habitat standpoint, upland vegetation at this site provides varied structure, from dense thickets to mature white pine/oak forest, with a substantial evergreen component, and ample rocky habitat features. The upland habitats complement the diverse wetland habitats discussed in the *Wetlands Report: Existing Conditions* (June 2016), and it supports good avian diversity. However, none of the upland habitats reviewed is in itself a noteworthy vegetation community, with significant uncommon to rare species, or the potential for them. As noted above, the rock outcrops on the ridges have sparse herbs because they are largely shaded by trees (i.e., *Fo*, *Fh*, and *Feo*). Shaded rock outcrops are not regarded as a CTDEEP critical habitat, with elevated likelihood of rare species. REMA noted that, as discussed in *Natural Disturbance and Patch Dynamics* (Picket and White 1985), some uncommon plant species, such as marginal wood fern (*Dryopteris marginalis*), were persisting on the small rocky gaps of the eastern ridge, presumably by means of gap colonization following small-scale

disturbances. However, normal forest diversity has not recovered in the maturing forests, following large scale disturbance by past farming, logging, and rock-quarrying. The viburnums, ericaceous species, and even dogwoods, are sparser than expected.

4.0 POND & VERNAL POOL SURVEYS

4.1 Overview

Two potential amphibian breeding areas were identified in February of 2016, during initial reconnaissance field investigations at the KEC Site. Specifically, these were the man-made pond (i.e., Wetland Unit A2), and a small flooded portion of Wetland Unit B (see Figure 2, Attachment A).

Investigations at the man-made pond began on February 4, and again on February 19, 2016, when it was still covered with ice (see Photos B-1, B-9 through B-13, Attachment B). During the surveys, smallmouth bass (*Micropterus dolomieu*), a few large tadpoles (i.e., green frog [*Lithobates clamitans*]), and a variety of aquatic invertebrates were identified.

REMA returned to the pond on March 11, 2016, because movement of wood frogs (*Lithobates sylvaticus*) to other amphibian breeding habitats had been documented in the region. However, no amphibian breeding activity was observed (see Photo B-2).

In the early evening of March 24, 2016, six minnow traps were set at the man-made pond. These were placed in a variety of microhabitats within the pond, including an area on the western shore with much submerged large woody debris (LWD). These traps were pulled out the next morning (i.e., March 25, 2016) and their contents were examined (see Photos B-15 through B-20). In all, 73 smallmouth bass were trapped, ranging from about 1.5 to 2.75 inches in length (total length: snout to tail). In addition, one backswimmer (*Notonecta sp.*) was trapped. The size of the minnow trap entrance hole would not allow larger fish to enter, but two or three larger adult fish, presumably also smallmouth bass, were observed on several occasions. No amphibian egg masses had been observed to date, but two spring peepers (*Pseudacris c. crucifer*) were heard calling from the pond. On March 31, 2016, no amphibian egg masses were observed during a perimeter viewing of the pond.

On April 13, 2016, a formal count of egg masses took place at the two amphibian breeding pools. The small embedded vernal pool habitat within Wetland Unit B held up to 12 inches of water at the time of the survey. The survey was conducted at the edge of the pool, without entering its core due to the presence of over 3 feet of organics. However, the water was very clear, not covered with pollen, and conditions were optimal for an egg mass count. A raft of 25-30 wood frog egg masses was observed in 9 to 10 inches of water, while five more egg masses were found in a couple of other locations. All of the wood frogs had hatched and most of the larvae were still present at or near the hatched egg masses (i.e., foraging had not begun). Additionally, a total of 22 spotted salamander (*mbystoma maculatum*) egg masses were observed in two distinct clusters in about 8 to 9 inches of water (see Photos B-23 through B-25, Attachment B). Several spring peepers were observed at the breeding pool during the survey.

The man-made pond was also investigated from its perimeter on the same date (i.e., April 13, 2016) as the survey at the Wetland Unit B breeding pool. A filamentous alga bloom somewhat obscured potential egg masses, but a minimum of 18 spotted salamander egg masses were counted. No wood frog egg masses were observed (see Photos B-21 and B-22).

REMA returned to the KEC Site on May 4, 2016, to again count spotted salamander egg masses at the man-made pond, while floating with a kayak, in order to not disturb the silty/organic substrate, which would obscure any egg masses. Most of the egg masses previously observed could not be found, and the few that were found had been predated, presumably by fish, or other predaceous invertebrates (see Photos B-28 through B-30). REMA also visited Wetland Unit B's vernal pool habitat and recounted the spotted salamander egg masses (see Photos B-26, and B-27). One additional egg mass was found, likely missed during the April 13, 2016 survey. The wood frog hatchlings had dispersed throughout the pool and were observed feeding.

The man-made pond was visited on May 20, and June 4, 2016, but no additional herptile activity was observed, except for a few spring peepers neomorphs at the pond perimeter (see Photo D-8). Also, gray tree frogs (*yla versicolor*) were heard calling near the pond, but also throughout the KEC Site, near wetlands. In the evening of June

12, 2016[4], a flashlight survey of the pond was conducted and five minnow traps were set. During the survey five adult smallmouth bass (size class: +/- 5 to 7 inches), several adult and juvenile green frogs, and seven crayfish (*Cambarus* sp.) (size class: +/- 3 to 5 inches) were observed. The following morning (June 13, 2016), the minnow traps were pulled. Thirty-seven smallmouth bass and one bull frog (*Lithobates catesbeianus*) tadpole had been trapped.

By the next visit to the KEC Site on July 21, 2016, for the purpose of observing the amphibian breeding habitats, the embedded vernal pool at Wetland Unit B, was not found with any inundation. Wood frog neomorphs would be expected to have emerged from this pool before the pool went "dry," based on typical wood frog reproductive behavior, and observations at other pools with similar hydroperiods in the region, which also had dried up by the end of June of 2016. However, due to the moderate-drought that was experienced in May through July 2016 in the region, it is not likely that this was a successful reproductive year for spotted salamanders, except in semi-permanent pools or pools with more than 2 feet of seasonal inundation.

During the amphibian breeding pool investigations, an off-site pool was encountered. This is a small, fishless impoundment, of the seasonal stream that flows out of Wetland Unit B. This small pond, holds up to three feet of water, and is about 100 feet upstream of the Quinebaug River, and about 400 feet downstream of the KEC Site. On March 25, 2016, about 20 wood frog egg masses were observed via a perimeter survey, but no spotted salamanders (see Photos B-14 and B-31). It is possible that spotted salamanders laid egg masses at this pond in April, but no further surveys were performed to confirm.

4.2 Discussion

The embedded vernal pool habitat of Wetland Unit B is the only viable on-site habitat for the breeding and reproduction of wood frogs and spotted salamanders, which are considered obligate "vernal pool" amphibians. While spotted salamander egg masses were observed at the man-made pond (i.e., Wetland Unit A1), predation by fish, green and bullfrogs, and other predators (e.g., crayfish), preclude successful reproduction. In fact, the pond is an "ecological sink" or "trap," which due to the surrounding suitable

[4] This was also the night when an owl call-back survey was conducted (see section on avian surveys).

terrestrial habitat and the favorable hydroperiod attracts spotted salamanders to a poor quality habitat for breeding, with only a slight possibility of reproductive success. However, the pond appears to be suitable breeding habitat for green frogs, to a lesser extent for bull frogs, and also to spring peepers.

The Wetland Unit B embedded vernal pool habitat, does not appear to have optimal hydrology for the reproduction of spotted salamanders, yet even if reproduction fails every other year for these mole salamanders, a sizeable population will persist at the Generating Facility Site, and its environs, for these long-lived amphibians[5].

Development will not encroach more than about 430 feet from the edge of the vernal pool habitat in Wetland Unit B, as measured from the toe of the proposed fill slope, for the electric generation facility. A significant amount of suitable terrestrial habitat will remain in the vicinity of this breeding habitat for the terrestrial phase for both of the obligate vernal pool amphibians. Dispersal and connectivity corridors will remain significantly intact, including connectivity with the documented off-site vernal pool habitat, thus continuing to support metapopulations dynamics.

5.0 AVIAN SURVEYS

5.1 Overview

Avian diversity at the KEC Site was assessed using several methodologies. First, the point-census method of inventory was employed, following a protocol for breeding bird surveys often used in Connecticut (i.e., Modified Ontario Method). The point census took place during early mornings in June 2016. Second, an owl call-back survey was conducted during evening hours, also in June 2016. Third, avians were inventoried by REMA staff during multiple visits, while gathering baseline natural resource data, and during the delineation of wetland boundaries, at the beginning of the 2016 growing season. While the bulk of breeding bird surveys took place during June 2016, avians were observed at the KEC Site during a sixth month period (February to July), and included early spring migrants.

[5] Adult spotted salamanders live 15 to 20 years, with some recorded as old as 30 years.

5.2 Breeding Bird Survey

5.2.1 Introduction

At the KEC Site, breeding bird diversity and relative abundance was measured using a point count census. Point counts have become one of the standard methods for counting birds (Hagan et al. 1997).[6] The specific method used at the KEC Site was adapted from the CTDEEP protocol for forest bird surveys. The CTDEEP surveys are based on standard procedures developed by Daniel Welsh[7] of the Canadian Wildlife Service. This point count method (called the Ontario Method) is being used in large-scale monitoring programs for forest birds in Ontario, Canada, and throughout the Northeast, including Connecticut.

While the Ontario Method is used to survey large tracts of forestland, it can also be successfully adapted for use with any habitat type and habitat size as long as the standardized procedures are used. Thus, researchers can to a certain degree compare the results to those from other parts of the State or other parts of the country.

5.2.2 Procedures

Several points along one or more transect are established in such a way that the area of interest can be covered spatially and qualitatively (i.e., covering all habitat types). Points are typically not closer than 250 to 300 feet from each other. When forest-interior birds are being surveyed the Ontario Method calls for each point to be at least 100 meters (i.e., 330 feet) from an edge habitat or from open water, but this is not possible in all areas that are surveyed.

Each point is surveyed according to the following procedures:

1. The point is visited early in the morning. All surveys are completed between 5:30 and 9:30 a.m. If feasible, one survey takes place in the first half of this period (5:30 - 7:30), and the other in the second half (7:30 – 9:30).

[6] Hagan, J.M., McKinley, P.S., Meehan, A.L., and Grove, S.L. 1997. Diversity and abundance of landbirds in a northeastern industrial forest. J. Wildl. Manag. 61: 718-735)
[7] Welsh, D.A. 1995. An overview of the forest bird monitoring program in Ontario, Canada. USDA Forest Service Gen. Tech. Rep. PSW-GTR-149.

2. The point is visited twice during the breeding season. Preferably, both visits are in June after the passage of migrants and before the frequency of singing declines markedly. Every attempt is made for one visit to be between June 1 and June 15 and the other between June 16 and June 30. Visits to the same survey point are spaced by at least 6 to 8 days. No survey takes place after July 15, since in a normal year most birds are not defending territories in late July and August.

3. Surveys are not conducted when weather conditions substantially reduce the number of birds that are detected. Counts are not attempted when it is raining or when there are strong winds.

4. Counts may begin as soon as the observer reaches the point, but a three-to-four-minute acclimation period is typically observed to reduce observer influence on birds.

5. A compass is used to orient the data sheet (see example in Attachment D) so that the top of the sheet is facing at a known direction.

6. All birds heard or seen are counted during a 10-minute observation period. A stopwatch is used to time observations, and the starting time is marked on the data sheet. Weather conditions and temperature are recorded on the data sheet after the 10-minute observation period.

7. The relative positions of birds are mapped on the standard data sheet (see Attachment D). Locations and movements are indicated over the course of the observation period.

8. The species of each individual are indicated using standard AOU codes (e.g., AMCR for American Crow).

9. The positions of the birds in the first and second halves of the observation period shall be recorded. This helps to track the movements of individual birds so that they are not double counted. Birds that are heard or seen during the first half of the observation period shall be indicated with the superscript "1." Birds that are heard or seen during the second half of the observation period shall be indicated with the superscript "2."

10. Whenever two or more individuals of the same species are observed together this is indicated using standard symbols provided in the data sheet. Also, the appropriate symbols are used that distinguish males, females, singing and non-singing birds, territorial disputes and other information.

11. Only one observer at a time shall record observations. This helps the observer to track individual birds.

While this method provides more objective information, than would be gained during informal observations, and useable results on diversity and relative abundance of breeding birds, certain limitations to this methodology remain:

1. The tallies are only a relative measure of bird abundance and do not express the total population of birds using a given area, just the number that was counted during a time interval.

2. Comparing one species with another can be problematic, because some species have different detention rates. For example, quiet and shy species are harder to see or hear.

3. The method tallies birds without doing much to distinguish individuals. For instance, if the data show that 25 rose-breasted grosbeaks were detected during the first and second dates in June, it does not mean that these were the same individuals.

5.2.3 Results

In all, 14 avian census points (i.e., AP-1 through AP-14) were established at the KEC Site (see Figure 3, Attachment A; see Photos C-1 through C-14, Attachment B). The majority (i.e., 12 points) were set up at the Generating Facility Site, while two points were established at the Switchyard Site. Of the total points, eight (i.e., AP-1 through AP-6, AP-13, and AP-14) were located in habitats that would be cleared for the proposed development of the site. The coverage of avian census points was complete enough to characterize sufficiently breeding avian usage of the entire site, with a possible exception of the northernmost section.[8]

The surveys were conducted at least twice at each of the established points, on three separate dates. On June 4, 2016, surveys took place at eight of the avian census points between 5:57 a.m. and 8:11 a.m. On June 10, 2016, all 14 points were visited between 5:58 a.m. and 8:17 a.m.[9] Finally, on June 19, 2016, breeding birds were counted at eight points between 6:12 a.m. and 8:30 a.m. The weather was suitable for avian point counts on all of the June 2016 dates.

[8] It is estimated that the area with low coverage is roughly 4.5 acres in size.
[9] On June 10th, 2016, George Logan of REMA was assisted by field biologist Jonathan Trouern-Trend, who also conducted the lepidopteran surveys for REMA at this site. Mr. Trouern-Trend also completed the avian surveys on June 19th, 2016.

Table A (see Attachment D) compiles all of the data from the breeding bird survey using the Ontario Method at the KEC Site.[10] It also includes all other birds observed during five site visits spanning June 4, to June 19, 2016, but not while conducting surveys at the 14 established points. Attachment D also includes a bar graph depicting avian usage at the site, with notes on the most abundant and most notable species. In all, 582 individual bird observations were made of 72 species.

As seen on the aforementioned bar graph, the most abundant bird species at the KEC Site, and specifically the Generating Facility Site, is the ovenbird (*Seiurus aurocapilla*) (see Photo C-17, Attachment B), with 60 total observations, almost twice as many as the next most abundant species, the blue jay (*Cyanocitta cristata*). Both of these species have two of the loudest songs and vocalizations of breeding birds in Connecticut, which may partially be responsible for the high numbers in the survey. These two bird species also illustrate the Generating Facility Site's habitats. The ovenbird is a denizen of closed-canopy forests, while blue jays prefer forest edges and do not venture deep into maturing forest. The first is considered a forest interior specialist, while the blue jay is a forest edge generalist. The KEC Site is characterized both by maturing forest and by forest edges.

Two different groups of birds emerge from the data. The first is comprised of seven species that make up 151 of the 582 individual bird sightings (i.e., 25.9%). These are considered amongst the most abundant bird species in Connecticut (Bevier 1994)[11]: mourning dove (*enaida macroura*), blue jay, American crow (*Corvus brachyrhynchos*), black-capped chickadee (*Poecile atricapillus*), American robin (*urdus migratorius*), and northern cardinal (*Cardinalis cardinalis*). They are species that are well adapted to a variety of habitats, including forest edges, small woodlots, rural landscapes, and suburbia.

The second group is composed of four species that make up 134 of the 582 individual bird sightings (i.e., 23.0%). These are all considered forest-interior bird species: red-eyed vireo (*ireo olivaceous*), wood thrush (*ylocichla mustelina*), ovenbird, and scarlet tanager (*Piranga olivacea*). These species are well adapted to forest interiors

[10] With the exception of one example of the Point Count Location Mapping data sheet (see Attachment C) the other field data sheets are not included. They can be provided upon request.
[11] Bevier, L.R. 1994. The Atlas of Breeding Birds in Connecticut. State Geological and Natural History Survey of Connecticut. Department of Environmental Protection. Bulletin No. 113.

and are not often found in small woodlots. They are sensitive to parasitism by brown-headed cowbirds (*Molothrus ater*), also observed at the site, which are typically found at forest edges. Thus these forest-interior birds are most often found several hundred feet away from forest edges, in deeper woods, and are somewhat sensitive to habitat fragmentation.

5.3 Owl Call-back Survey

In the evening of June 12, 2016, REMA conducted an "owl-call back survey," at two stations, one at the Generating Facility Site, and one at the Switchyard Site (see Figure 3, Attachment A). The surveys were conducted between a half an hour after sunset and a half hour before midnight.

Some of the methodologies put forth in Takats et al. (2001)[12] were employed, including silent listening and playback. At each station a period of silent listening (roughly 10 minutes) preceded broadcasting recordings of owl vocalizations. Playback used digital recordings (Audubon Birds Pro), played through a Bose SoundLink Mini II Wireless Speaker, which produces clear and loud sound without distortion.

Three 12-minute periods of alternating broadcasts and silent listening were used, for each of the three possible owl species, starting with the smaller eastern screech owl (*Megascops asio*), then the barred owl (*Strix varia*), and finally, the great-horned owl (*ubo virginianus*).

At the Generating Facility Site, REMA confirmed the presence of a breeding pair of barred owls. These had been heard vocalizing in the woods (i.e., Wetland Unit A3) as early as February of 2016, and had been also sighted at the small man-made pond (Wetland Unit A1) in May and June. At the Switchyard Site REMA observed one eastern screech owl, within the southern wooded section, adjacent to the Eversource electric transmission right-of-way.

[12] Takats, D.L, C.M Francis, G.L. Holroyd, J.R. Duncan, K.M Mazur, R.J. Cannings, W. Harris, D. Holt. 2001. Guidelines for Nocturnal Owl Monitoring in North America. Beaverhill Bird Observatory and Bird Studies Canada, Edmonton, Alberta. 32 pp.

5.4 Discussion

The clearing of woodland at the Generating Facility Site, will decrease the abundance of forest-interior bird species, such as wood thrush, ovenbird, scarlet tanager, veery (*Catharus fuscescens*), Louisiana waterthrush (*Parkesia motacilla*), and black-throated green warbler (*Setophaga virens*). The new forest edge created by the proposed development shall also push the zone of influence by the parasitic brown-headed cowbird further into the interior of the Generating Facility Site's upland and wetland forested habitats. However, the northern and northwestern sections of the site, which includes the western bedrock dominated ridge, as well as the eastern forested ridge, will continue to provide suitable habitat for all the aforementioned species, with the possible exception of the Louisiana waterthrush, a wetland-depended species, observed breeding within Wetland Unit A3, which may be displaced.[13]

From a regional perspective all of the forest-interior species observed at the site, as well as other forest and forest edge specialists such as eastern wood pewee (*Contopus virens*), rose-breasted grosbeak (*Pheucticus ludovicianus*), and pine warbler (*Setophaga pinus*), are secure within their Connecticut range. None of these species are "listed" in Connecticut (i.e., endangered, threatened, special concern), and their IUCN[14] conservation status is "Least Concern" (LC). Moreover, within close proximity to the KEC Site, even immediately to the west, but also to the west of the Quinebaug River, are hundreds of acres of protected or undeveloped forest land with much interior or "core" forest, which undoubtedly support all of the forest-interior avians observed at the site. This includes the Natchaug State forest (see Figure 4, Attachment A).

6.0 LISTED SPECIES

6.1 Overview

In a response to a query of the CTDEEP Natural Diversity Database (NDDB), dated March 8, 2016, several species were identified as potentially occurring at the KEC Site

[13] REMA has observed this species in several riparian habitats in Connecticut, which would not be considered "core" forested habitat (i.e., small woodlots). However, actual fledgling activity, observed at the KEC Site, was not observed at some of these smaller woodlots, with disturbance nearby.
[14] International Union for Conservation of Nature.

or the immediate vicinity. The CTDEEP list included three invertebrate species (i.e., one butterfly and two moths),[15] as well as three vertebrate species. These are the wood turtle, the eastern box turtle (*errapene c. carolina*), and the Red bat (*Lasiurus borealis*), all Species of Special Concern.

An acoustic bat survey was conducted by Tetra Tech wildlife biologists, targeting the federally and state-listed northern long-eared bat (*Myotis septentrionalis*) (NLEB). While NLEB was not detected, several other bat species were detected as potentially foraging or roosting at the site. Of the five bat species detected, four species – the eastern red bat, hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and little brown bat (*Myotis lucifugus*) – are "listed" in Connecticut. Based on the presence of the "Connecticut-listed" bat species at the site the Tetra Tech report recommends that tree clearing at the KEC Site not occur in the months of June and July in order to avoid the pup season for the bat species.

One Connecticut *Species of Special Concern*, the broad-winged hawk (*uteo platypterus*), was observed by REMA at the site. The sightings were on separate days and in separate areas. One sighting was at the Switchyard Site, within the deciduous forest to the southwest of Wetland Unit D, while the other was just off-site, about 80 to 100 feet to the west of the Generating Facility Site's western property boundary, again in predominately deciduous forest.

Broad-winged hawks are often observed within wetlands and riparian areas, feeding on a variety of prey: small birds, amphibians, and a variety of insects, and they are typically found in large blocks of unfragmented habitat, such as that at this site and its environs. However, no indication of nesting was encountered within the KEC Site. With the abundance of suitable habitat in the vicinity of the site, and also remaining, post-development, with the site, breeding habitat for this species is secure.

[15] The results of a lepidopteran survey conducted by REMA associate Jonathan Trouern-Trend, dated August 2016, is submitted separately. It concludes that no State-listed lipedopterans occur at the KEC Site.

6.2 Reptile Surveys

6.2.1 verview

REMA conducted reptile surveys at the KEC Site including targeted searches for the two "Connecticut-listed" reptiles (i.e., wood turtle, Eastern box turtle) that have been documented by the CTDEEP as potentially occurring in the site vicinity.

Cover searches for reptiles, including the aforementioned turtle species, took place at the KEC Site in the morning hours of May 26, June 10 and June 13, 2016. Also, off-site cover searches, specifically targeting wood turtle, were conducted in the afternoon of July 21, 2016, along the Quinebaug River riparian corridor.

The "listed" turtles were not encountered at the site or its immediate vicinity[16]. However, other reptiles, particularly snake species, were encountered at the KEC Site, including milk snake (*Lampropeltis t. triangulum*), brown snake (*Storeria dekayi*), and ring-neck snake (*Diadophis punctatus edwardsii*) (see Photos D-8 and D-11).

6.2.2 Eastern Box Turtle Terrapene c. carolina

Habitat on this site is suitable for eastern box turtle, particularly the eastern forested ridge at the Generating Facility Site, and the woods immediately adjacent to Wetland Units A1 and A2 and also adjacent to the eastern portions of Wetland Unit A3 (see Figure 2, Attachment A). Most of the Switchyard Site contains suitable habitat for this species. The maintained Eversource electric transmission right-of-way in close proximity to the KEC Site, increases the likelihood that box turtles utilize the subject site.

This omnivorous species with a patterned, orange, yellow, or tan carapace forages in both forested, meadow, and scrub-shrub habitats, although it is most often observed in open habitats, along field edges and power lines. Box turtles feed on a variety of invertebrates, fungi, and some plant matter, especially berries. Invertebrates are plentiful under forest leaf litter. Moist or mesic habitats are preferred. More ground-level food is typically available in moist habitats, especially snails, a preferred food.

[16] At the Switchyard Site, cover searching extended into the Eversource electric transmission right of way, immediately off-site and to the east.

Because box turtles are sensitive to desiccation (physiologically they are more similar to an aquatic turtle), foraging in dry habitats is typically limited to the dewy morning hours in hot weather, and they often rest in the shade of a shrub during the midday period.

Hibernation occurs in a variety of places, including soft wetland or transitional soils, crevices between rocks, rotting stumps, and burrows in sandy soils (Dodd 2001[17], Claussen 1991[18], and unpublished recent data from Southern CT State University). During hot summer spells they will typically rest in moist "forms" under leaf litter or buried in topsoil, with perhaps only the head visible.

Home ranges are well-defined and quite variable in size and shape (Dodd 2001) based on radio-telemetry studies, mark recapture, and thread tracking studies. The core foraging area may be less than an acre in size, although they make exploratory forays, and travel longer distances to nesting areas and hibernation sites. Home range diameters of males in the Maryland study by Olson (1989)[19] study averaged 100.6 meters (i.e., 332 feet), that of females 112.8 meters (i.e., 372 feet). Turtles may also leave a core foraging range to travel to a choice season foraging area such as a mulberry tree dropping its fruit or a field of wild strawberries.

This is a "Special Concern" species because many formerly robust Connecticut populations are either extinct or remnants. Box turtles are long-lived in a natural setting, typically over 45 years and up to 100 years, but juvenile and egg survivorship is low, egg clutches are small, and egg fertility is low. Although they can typically meet their foraging needs in a moderately fragmented landscape, adult mortality rates increase, due to road kill, mower kill, and other causes.

Assessment Based on the moderate level of search effort under favorable conditions, REMA concludes that it is *likely* that eastern box turtles occur at site, given the availability of habitats and the landscape context.

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[17] Dodd, C.K., Jr. 2001. North American Box Turtles: A Natural History. University of Oklahoma Press.
[18] Claussen, D.L., M.P. Daniel, S. Jiang, and N. A. Adams. 1991. Hibernation in the Eastern Box Turtle (*errapene c. carolina*) J. of Herpetology. 25: 334-341.
[19] Olson, R. E. 1989. Notes on evaporative water loss in terrestrial chelonians. Bull. Maryland Herpetological Society. 25: 49-57.

6.2.3 Wood Turtle Glyptemys insculpta

Wood turtles are always found in association with riparian habitats, more often large perennial streams and rivers, which are bordered by forest and open meadows (Klemens 1993).[20] Wood turtles are wide-ranging, in their terrestrial phase with large riparian buffer needs, using upland forest, wetland forest, as well as shrubland and wet meadow. For example, a Wisconsin study by Harding and Bloomer (1979)[21] documented overland movement of 150 meters (495 feet) from the stream; REMA's own Connecticut field survey work of wood turtles found even further (over 900 feet) from the trunk watercourse, for example a nesting wood turtle in Meriden, about 950 feet east of Broad Brook Reservoir. Especially due to their propensity to roam far afield from their home watercourse, wood turtles are vulnerable to roadkill and pet collection.

At the KEC Site, the core habitat for wood turtle is located off-site to the west and northwest, along the Quinebaug River riparian corridor (see Photos D-1 through D-6, Attachment B). While suitable terrestrial habitat exists at the site, such as deciduous woods and open field, local topography greatly inhibits connectivity between the Quinebaug River habitats and those of the site. The Generating Facility Site's prominent western ridge blocks movement of wood turtles. Moreover, slopes immediately to the east of the Quinebaug River are too steep for wood turtle passage (see Photo D-4).

Assessment Based on the moderate level of search effort under favorable conditions, REMA concludes that it is *not likely* that wood turtles occur at site, given the availability of habitats, and local topography.

[20] Klemens M.W. 1993. Amphibians and Reptiles of Connecticut and Adjacent Regions. State Geological and Natural History Survey of Connecticut. Bulletin No. 112.
[21] Harding J.H. and T.J. Bloomer. 1979. The wood turtle, *Clemmys insculpta*… a Natural History. Herp. Bulletin NY Herpetological Society. 15(1):9-26.

7.0 WILDLIFE INVENTORY

This section of the report synthesizes the avian, amphibian, and reptile surveys at the KEC Site, with observations made of mammal species, in the course of six months-worth of site visits, collecting baseline natural resources data. Mammal species were not specifically targeted. A full inventory would have required live trapping, which is beyond the scope of the natural resources inventories for the site. Even so, enough sign was available to produce a clear picture of mammal use at the KEC Site.

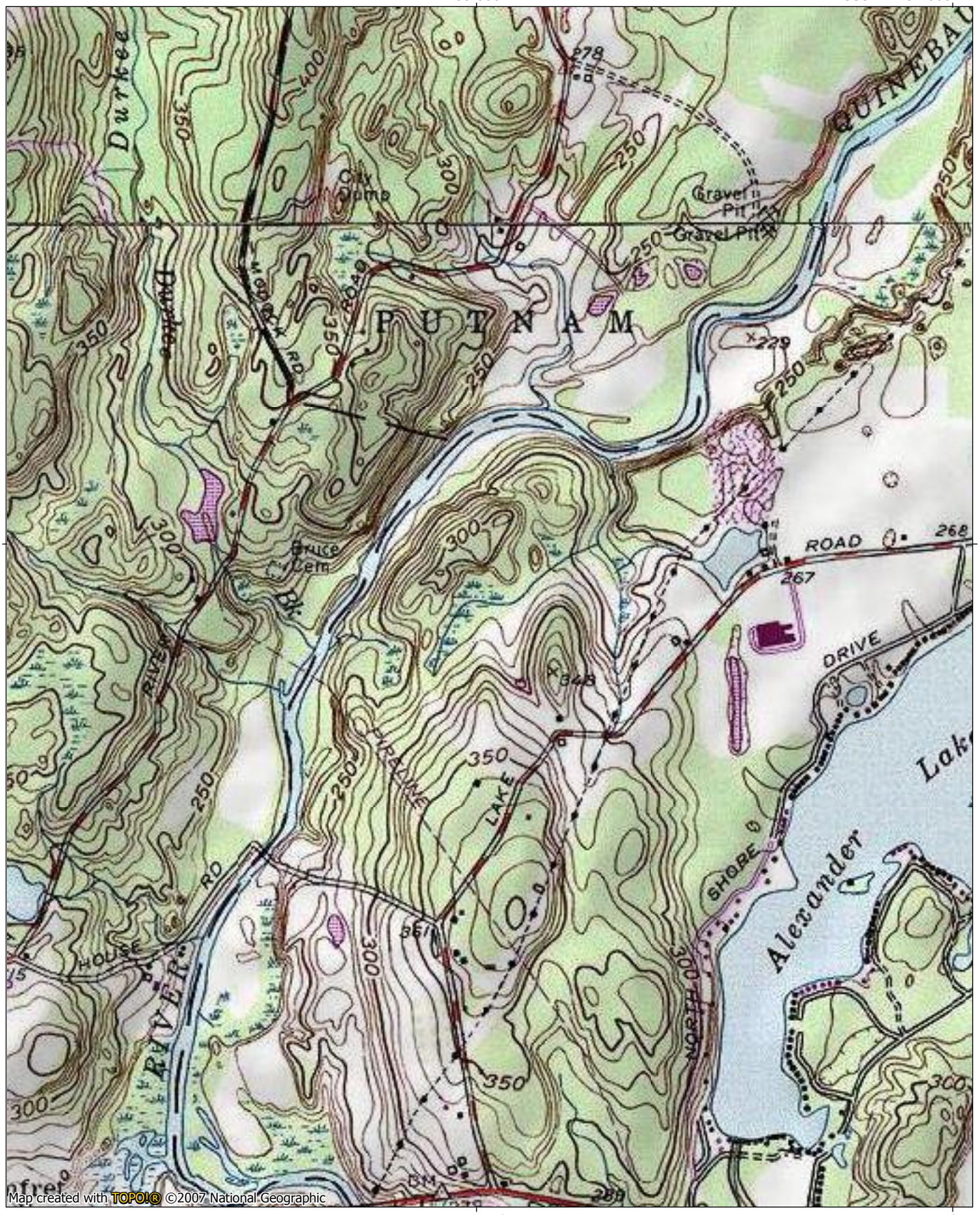
The resulting Wildlife Inventory (see Attachment E) not only lists the 109 vertebrate species observed at the site, but also lists another 44 *probable* and *possible* breeders and users of the KEC Site, based on known regional distributions, breeding bird surveys conducted in a neighboring municipality (i.e., Woodstock), and the presence and quality of habitat types and specific habitat requirements for all possible wildlife species.

ATTACHMENT A: Figures

Figure 1: Site Locus; 189 Lake Road, Killingly, CT

71°55.000' W

WGS84 71°54.000' W



41°52.000' N

41°52.000' N

71°55.000' W

WGS84 71°54.000' W

NATIONAL GEOGRAPHIC

0.0 0.1 0.2 0.3 0.4 0.5 miles

0.0 0.5 km

MN TN

14°

02/05/16

AP-10
AP-11
AP-9
AP-6
AP-12
AP-8
AP-5
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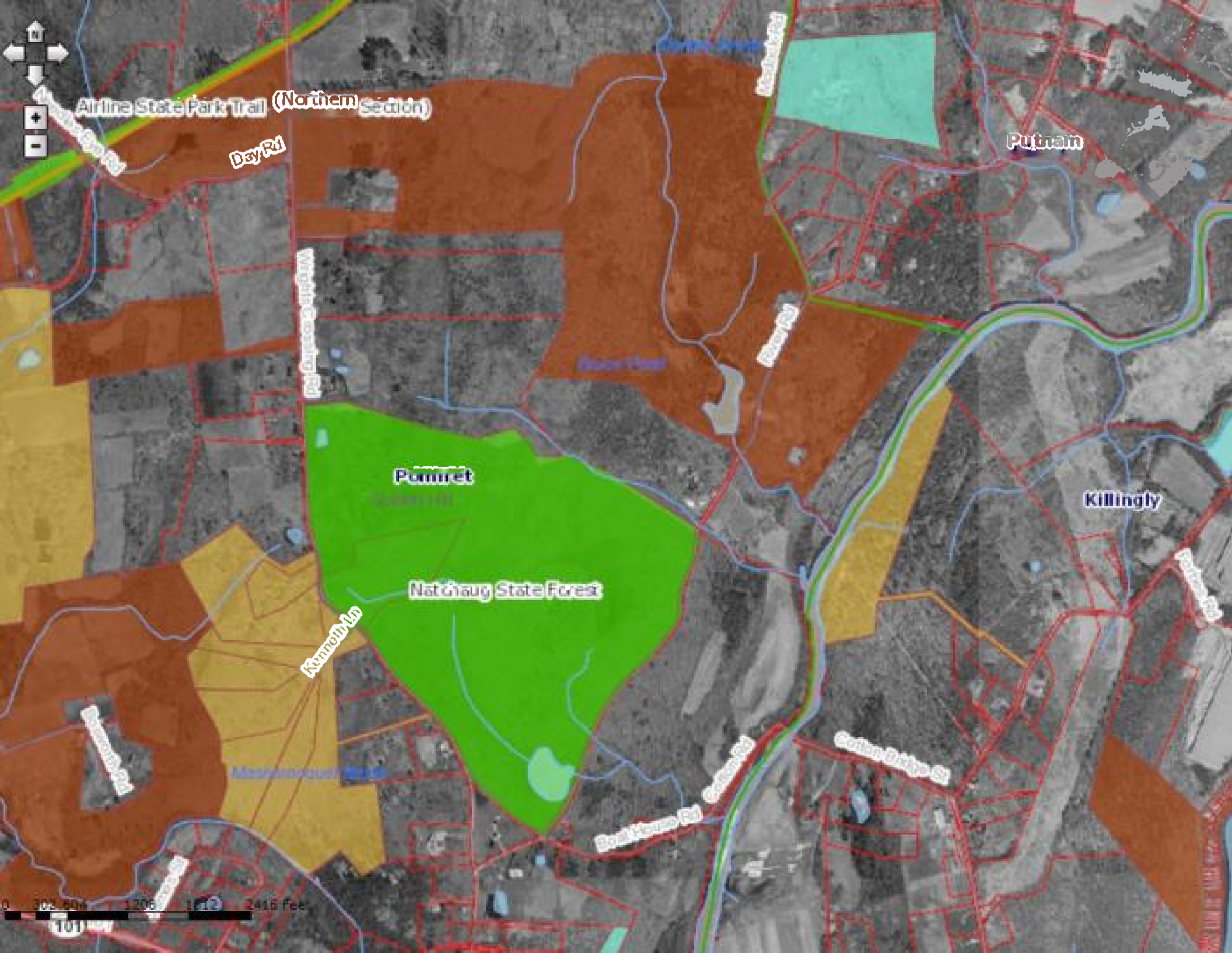
AP-2
AP-1
AP-3
AP-14
AP-13


Airline State Park Trail (Northern Section)
Day Rd
Putnam
Pomfret
Natchaug State Forest
Kennedy Ln
Killingly
Rock Maple Rd
Sutton Ridge Rd
0 300 600 1200 1800 2400 Feet

ATTACHMENT B: Annotated Photographs

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

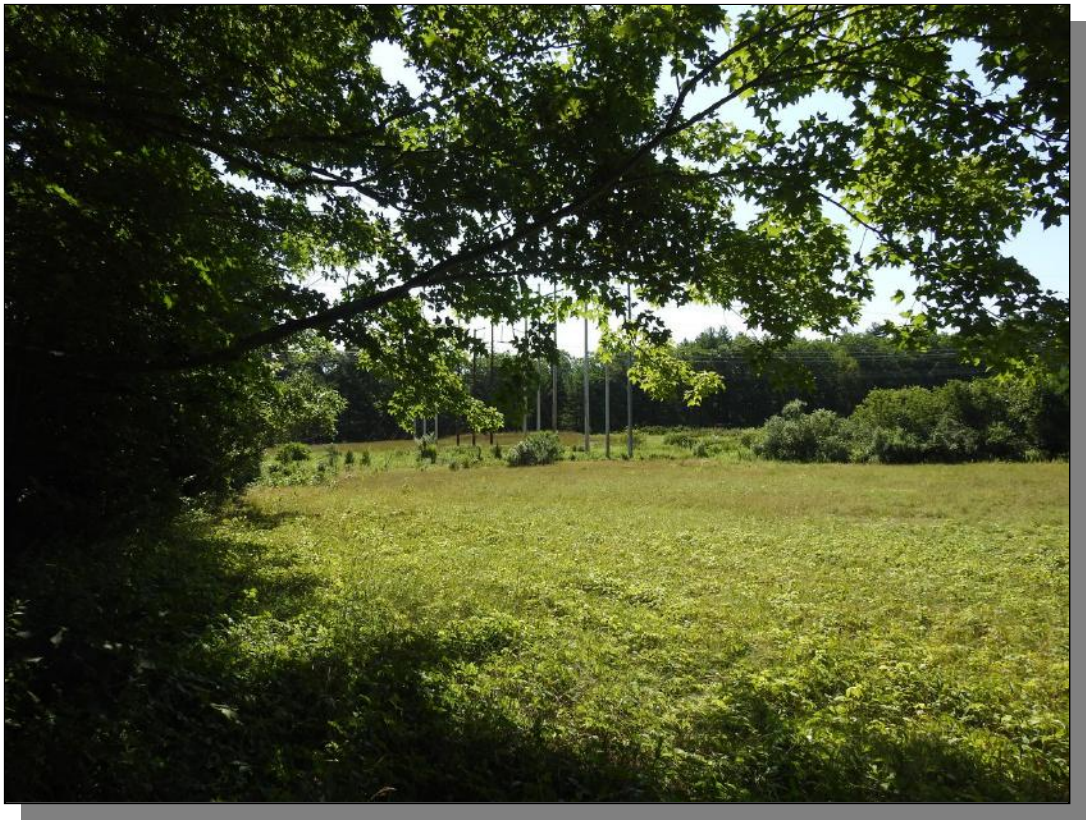


Photo A-1: Upland cover type, UGm (moist grassland), east of powerline and south of Lake Rd. with a mix of grasses and forbs. Field is mowed at least annually. Southeasterly view.

Photo A-2: Northwesterly view of upland cover type UGm (moist grassland), north of Lake Road and east of the home of the existing residence; regularly mowed.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-3: Upland cover type UGd (dry grassland), a clearing south of the pond and at the base of the eastern ridge. Upland oak forest (UFo) cover type in background.

Photo A-4: Close-up of drought-tolerant vegetation, plantain-leaved pussy toes and star moss in Upland cover type, UGd (dry grassland). Good habitat for ground beetles.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-5: Upland cover type UGs (successional grassland), a clearing south of Lake Road, dominated by goldenrod, among clonal black locust and within thicket cover type.

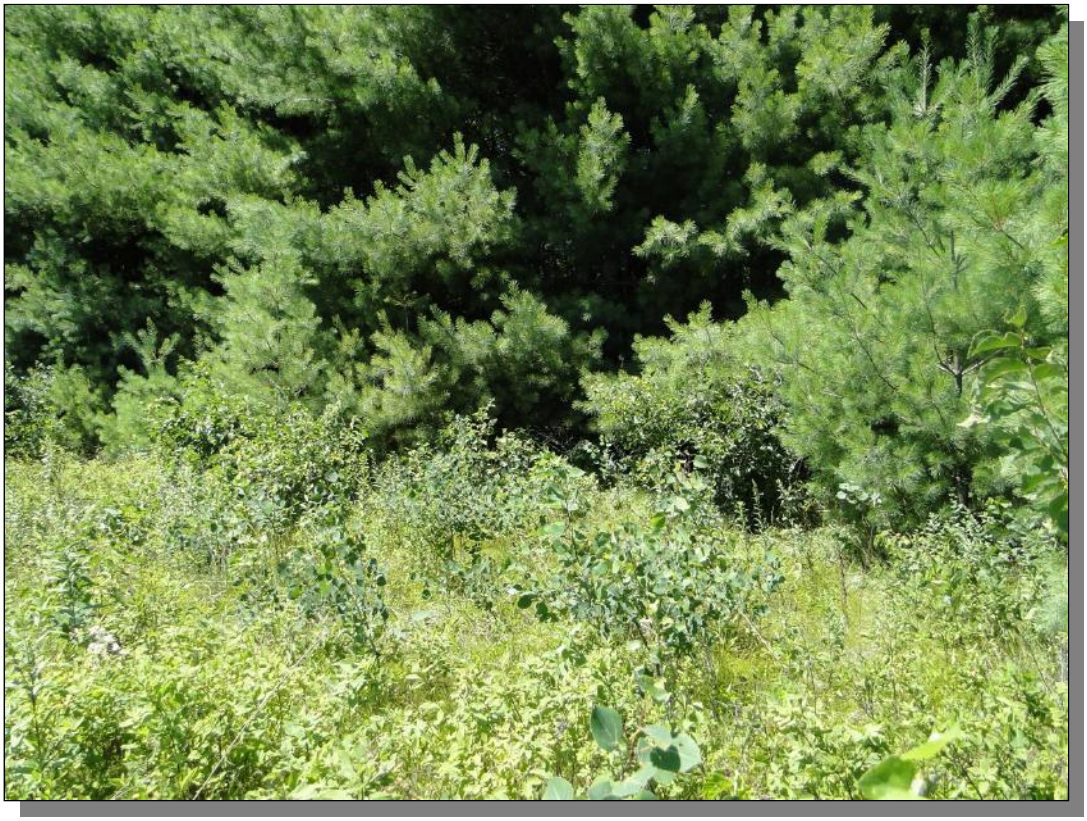


Photo A-6: Upland Cover type UGm (moist grassland), with woody 2016 seedlings. Occasional mowing has kept them in check, but field could become “successional”. Upland thicket cover type (USe) is in background: white pine (evergreen) saplings.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-7: Upland cover type, USd (deciduous shrub/sapling thicket), south of Lake Rd. in a former field. Vines are also important. Note invasives: Morrow's honeysuckle (red berries), As. bittersweet, Japanese knotweed (left), & Jap. barberry (lower right.)

Photo A-8: Upland cover type USd (deciduous shrub sapling thicket), borders the southern field (UGm). Invasive glossy buckthorn and autumn olive in foreground, left.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-11: Upland Cover type USj (Japanese knotweed thicket), left rear, on 5-20-16 with moist meadow in foreground (UGm). Yellow blooming flower is Golden alexanders.

Photo A-12: Upland Cover type USj (Japanese knotweed thicket) in former field, south of Lake Rd. Knotweed is behind stone wall. Former hedgerow has large sugar maples.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-13: Upland cover type, USe (evergreen sapling thicket) on 5-20-16, north of Lake Road. Closely spaced white pines have dieback of lower branches & sparse herbs.

Photo A-14: This large old white pine was likely a major seed source for the dense, nearby stand of the upland evergreen sapling cover type (USe) in the background.

Photo A-15: Highbush blueberry and glossy buckthorn (invasive) are both heavy fruit producers, important food sources for birds. Each dominates different parts of the shrub- lands south of Lake Road, in both uplands and wetlands, extending into the utility ROW.

Photo A-16: On-site the deciduous shrub thicket cover type (USd) is limited to the left edge of photo, but extensive adjacent shrubland habitat along the ROW increases diversity and populations sizes of the wildlife and invertebrate fauna within the site.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo 17: Cover type is immature upland forest, UFi. This is the moist lower hillside of the southwestern hill, south of Lake Road, near an old private cemetery. Herb stratum is dense.

Photo A18: Typical herb stratum in immature deciduous cover types (UFi and USd) south of Lake Road, with Virginia creeper, poison ivy, and sedges. In deciduous thickets north of Lake Rd. herb stratum consists mostly of Asiatic bittersweet seedlings.

Photo 19: Cemetery within the immature forested cover type (a former field on hillside shown in Photo 17.) Note the enclave of larger trees which escaped past mowing.

Photo A20: Hedgerows along stone walls consist of species in the upland moist deciduous forest cover type (UFm), such as white ash (left) and sugar maple. Trees are often very large, having escaped past mowing of adjacent fields.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo 21: Moist upland forest cover type (UFm), at the base of the north end of the eastern ridge, adjacent to Wetland Unit A2, northwesterly view. Hay-scented fern forms the ground cover; deciduous trees (red maple and black birch) are dominant.

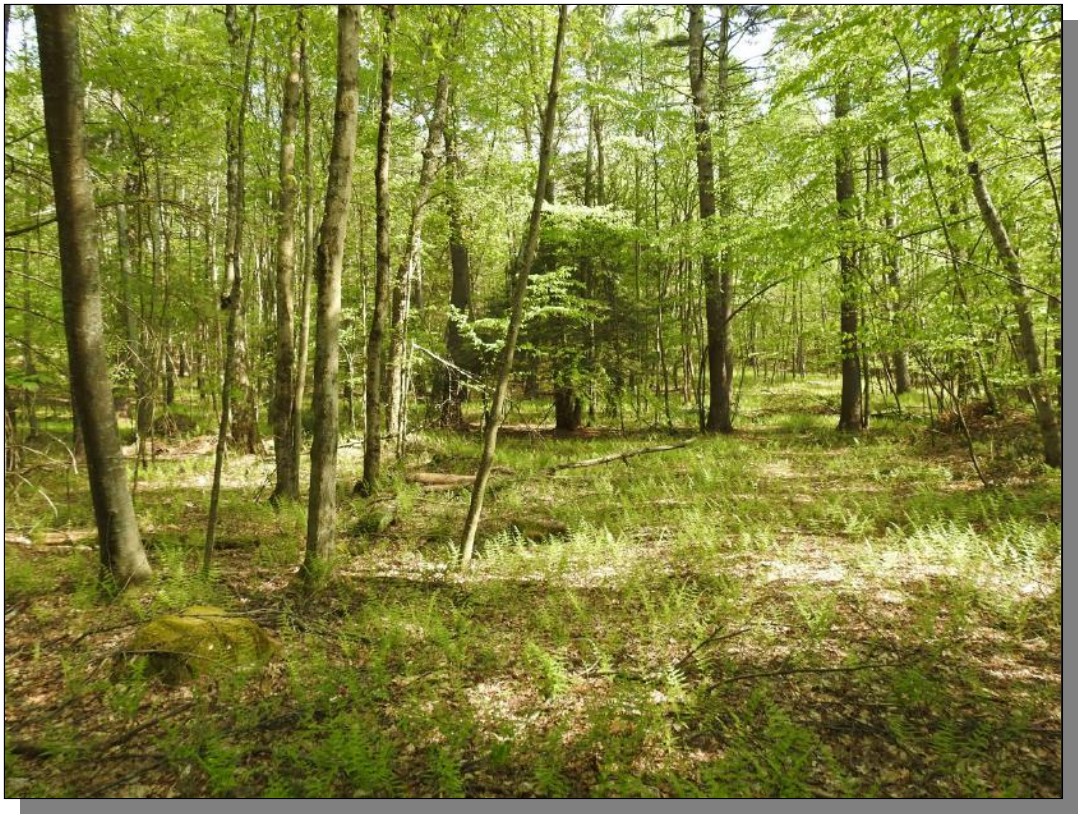


Photo A22: UFm cover type (moist deciduous forest) on level ground by Wetland Unit B. Hay-scented fern is dominant, but not fully expanded; photo taken on 5-20-16.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo 23: Upland oak forest (UFo) cover type on east-facing slope in southwestern corner of site, south of Lake Road (Switchyard Site); it has few rock outcrops and is moderately mature.

Photo A 24: Upland oak forest (UFo) cover type occupies portions of the rocky crest of the western ridge. Note wide range of size classes. Herb stratum present at lower right.

Photo 25: Upland Oak forest (UFo) is the cover type adjacent to a glade with Penn sedge and wood ferns on the spine at the southern end of the western ridge.

Photo A26: Close-up of marginal wood fern, taken at northern end of the western ridge. The habitat of this species is rocky terrain, regardless of bedrock composition.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-27: Upland cover type is mixed evergreen-hardwood forest (UFeo) on rocky crest of western ridge. Black birch is common, hemlock present, and mosses well-developed.

Photo A-28: Upland cover type is mixed evergreen-hardwood forest (UFeo). Penn sedge & star sedge grow in this glade on western ridge. Shagbark hickory is at center left.

Photo A-29: Upland cover type is mixed evergreen-hardwood forest (UFeo) on level summit of southwestern hill. Evergreen component is mature white pine, rather than hemlock.

*Photo A-30: M*ature mixed white pine-oak forest (UFeo) is the upland cover type on summit of the central hill, southeast of Wetland Unit A3. Note flat-top wall at right.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-31: This upland cover type is hemlock forest (UFh), with few other woody species and a sparse herb stratum. Site is a plateau at north end of the western ridge.

Photo A-32: Hemlock is also dominant on level land in the northern corner of the site. This cover type is UFh (m), as the moisture regime is mesic, not a dry ridge top.

Upland Cover Types associated with Killingly Energy Center, Lake Road, Killingly, CT
Photos taken March to July 2016, by REMA Ecological Services, LLC

Photo A-33: This upland cover type is also hemlock forest (UFh), growing on the western ridge crest. Woody debris dropped by dead trees in overcrowded stands is habitat. Understory vegetation is lacking due to dense shade.

Photo A-34: Starflower or *Trientalis borealis* is a common wildflower in multiple forested cover types, especially where evergreens are nearby, but light levels are not

Photo B-1: Man-Made Pond (Wetland Unit A1); February 2, 1916; facing northerly

Photo B-2: Man-made pond; March 11, 2016; Note outlet stream from springhouse; facing northwesterly

Photo B-3: Man-made pond (Wetland Unit A1); April 13, 2016; facing southerly

Photo B-4: Man-made pond; May 20, 2016; facing northwesterly

Photo B-5: Man-made pond; June 10, 2016; facing easterly

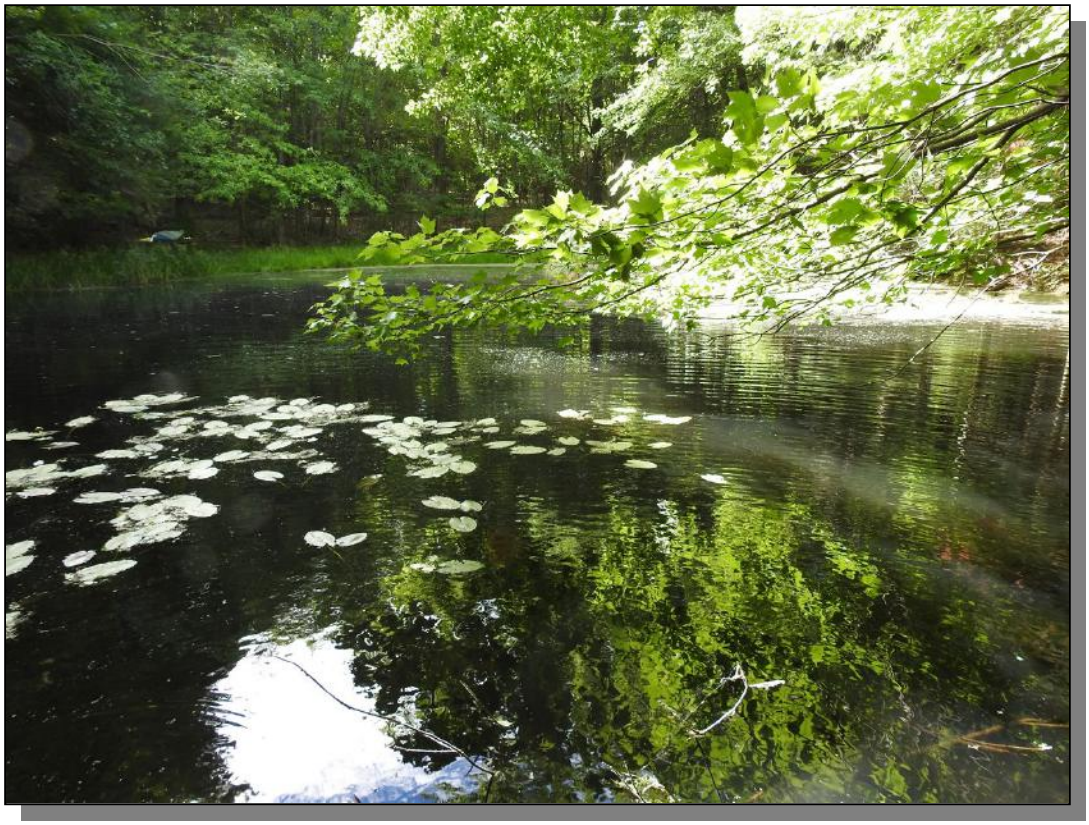


Photo B-6: Man-made pond; July 21, 2016; facing southeasterly

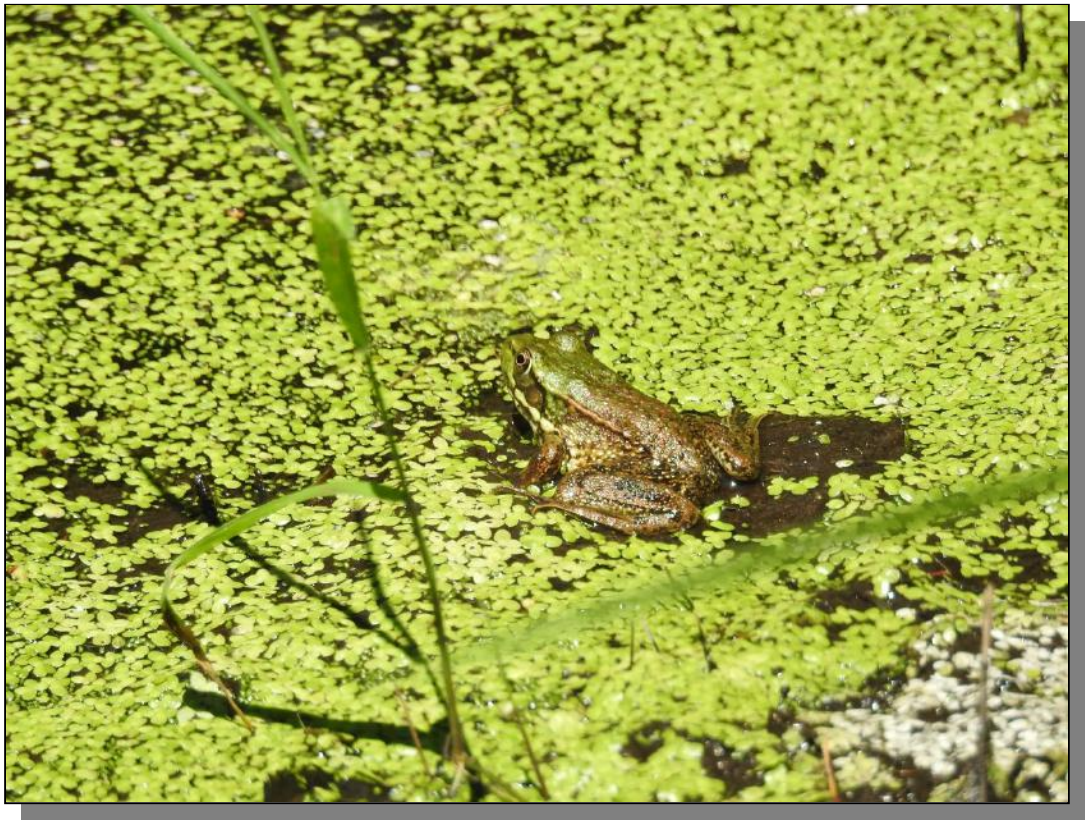


Photo B-7: Green frog *(Lithobates clamitans) in pond (Wetland Unit A1); July 2016*

Photo B-8: Juvenile bullfrog on minnow trap set at man-made pond; June 12, 2016

Photo B-9: Ice-breaking used for survey the man-made pond on February 19, 2016; facing northerly

Photo B-10: Many smallmouth bass (*Miropterus dolomieu)* were netted during survey on February 19, 2016.

Photo B-11: Juvenile small mouth bass in jar, February 19, 2016.

Photo B-12: Predaceous diving beetle (Dytiscid) from pond, on February 19, 2016.

Photo B-13: Water scorpion at pond (Nepidae family in the order Hemiptera, genus *Ranarta*), February 19, 2016.

Photo B-14: Off-site vernal pool on March 25, 2016. Amphibian egg masses were counted here, though no trapping was done.

Photo B-15: Minnow Trap #1, March 25, 2016. 12 juvenile smallmouth bass and 1 backswimmer (notonectid)

Photo B-16: March 25, 2016. Trap #2; nine juvenile smallmouth bass.

Photo B-17: Trap #3; March 25, 2016.

Photo B-18: Trap #5; March 25, 2016

Photo B-19: Trap #5; March 25, 2016

Photo B-20: Trap #6; March 25, 2016.

Photo B-21: Spotted salamander egg mass, left of oak leaf; in man-made pond (Wetland Unit A1); April 13, 2016

Photo B-22: Spotted salamander egg mass within colony of filmentous green algae; in pond (Wetland Unit A1); April 13, 2016

Photo B-23: Wetland Unit B (west side of site); embedded vernal pool habitat, on April 13, 2016.

Photo B-24: Wood frog egg masses (greenish hue, under blue flagging); in Wetland Unit B amphibian pool; April 13, 2016

Photo B-25: Large cluster of spotted salamander egg masses, a mix of opaque and clear, Wetland Unit B (west side of site) on April 13, 2016; note excellent water clarity.

Photo B-26: Search for amphibian egg masses in Wetland Unit B, during a rainstorm; May 5, 2016

Photo B-27: Large spotted salamander egg mass from Wetland Unit B, infused with green algae; May 4, 2016.

Photo B-28: Pond (Wetland Unit A1) during amphibian survey on May 4, 2016; facing northerly

Photo B-29: Predated spotted salamander egg mass from man-made pond, without embryos; May 4, 2016.

Photo B-30: Pond (Wetland Unit A1) during amphibian survey on May 4, 2016.

Photo B-31: Offsite vernal pool still has water on July 21, 2016 during a moderate to severe drought spell.

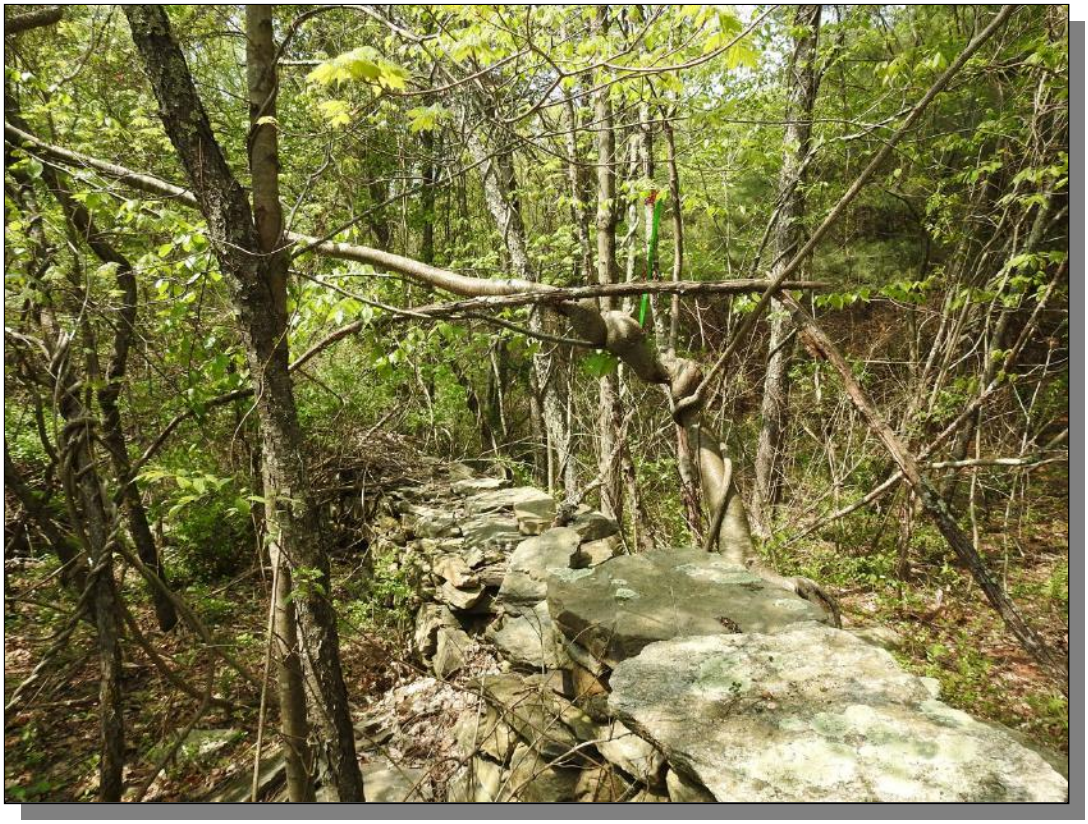


Photo C-1: Avian Point 1. Thicket habitat north of Lake Road; facing northerly

Photo C-2: Avian Point 2. Flat-topped stone wall separating mature mixed hardwood forest from thicket (former field); facing southerly

Photo C-3: Avian Point 3; facing northwesterly

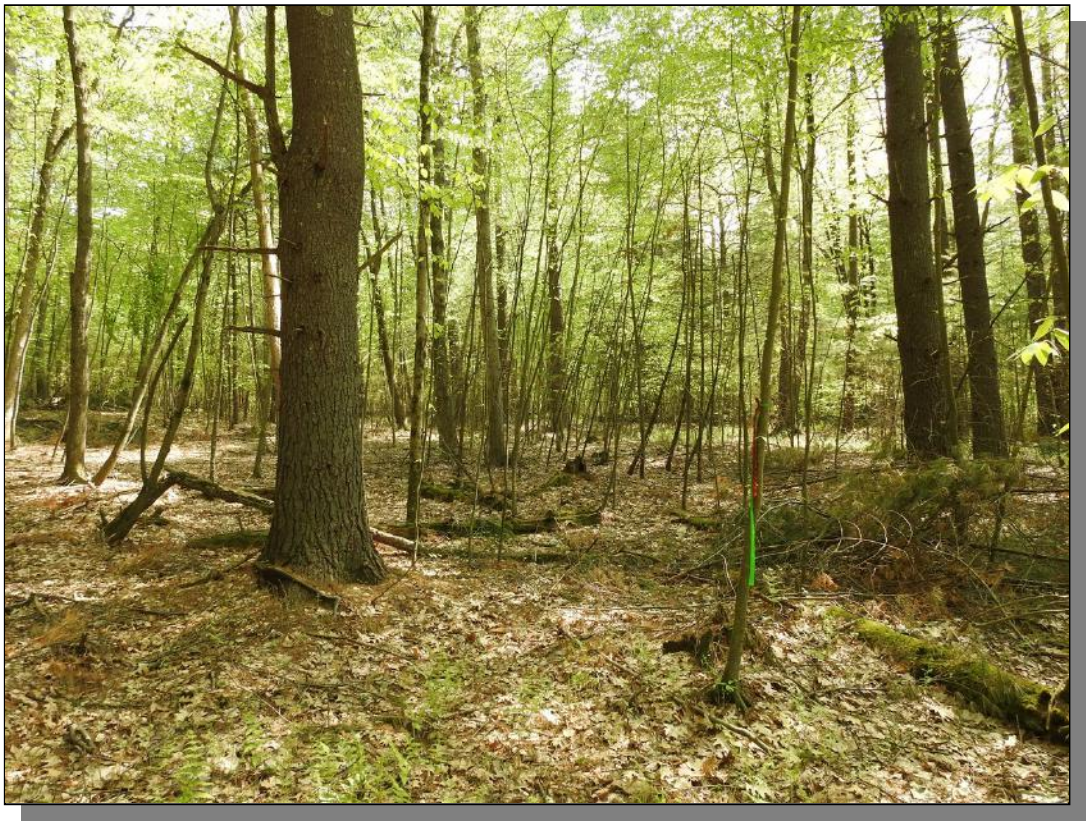


Photo C-4: Avian Point 4; facing northerly

Photo C-5: Avian Point 5. Lowland hemlock forest west of Wetland Unit A3; facing westerly

Photo C-6: Avian Point 6; edge of young, moist, pole-sized forest, upgradient of Wetland Unit A-2; facing northerly

Photo C-7: Avian Point 7. Immature moist woods just southeast of pond (Wetland Unit A1); facing northerly

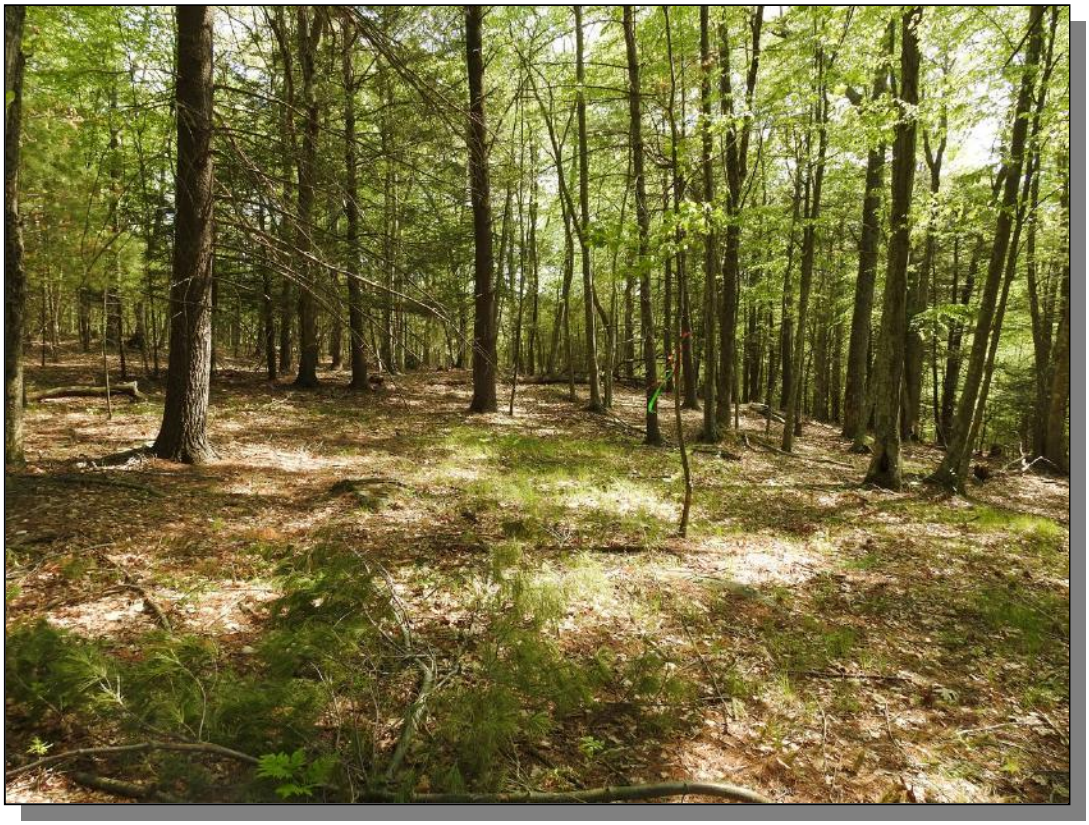


Photo C-8: Avian Point 8; Eastern ridge; facing southerly

Photo C-9: Avian Point 9; facing westerly

Photo C-10: Avian Point 10; facing southerly

Photo C-11: Avian Point 11; facing southerly

Photo C-12: Avian Point 12; facing southerly

Photo C-13: Avian Point 13; facing southwesterly

Photo C-14: Avian Point 14; facing northeasterly

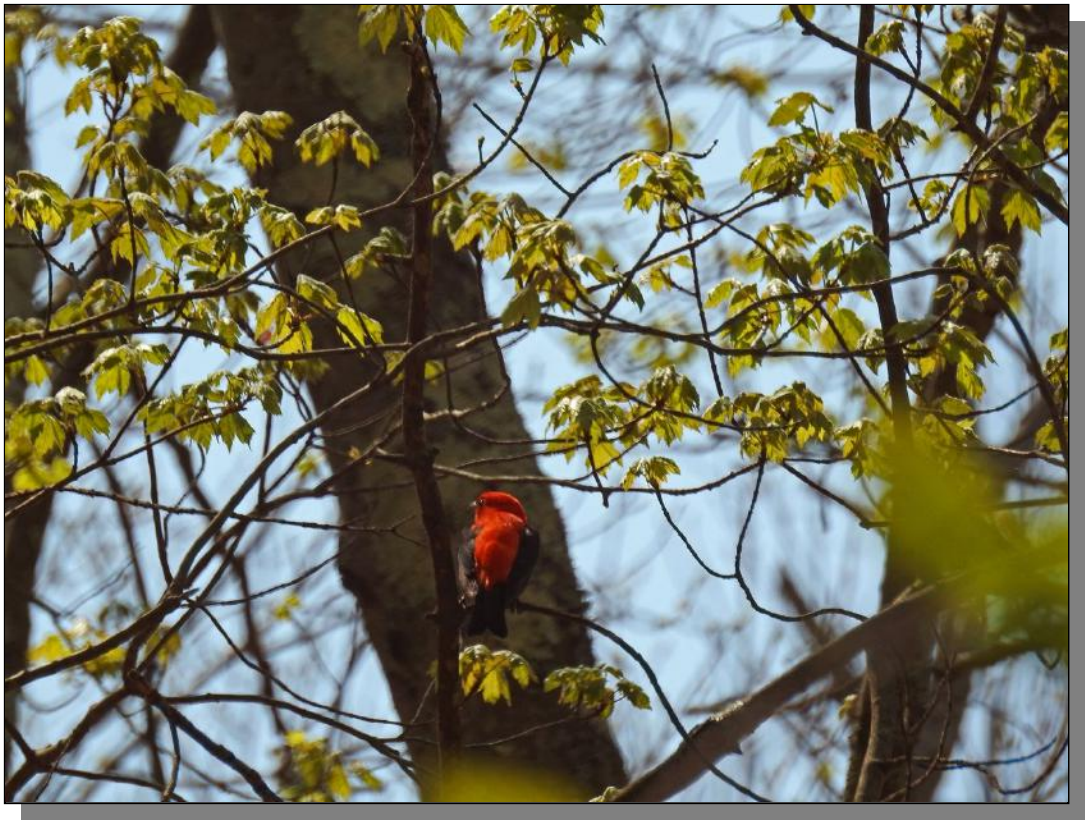


Photo C-13: Scarlet tanager; from eastern forested ridge

Photo C-14: Eastern Wood Pewee; eastern forested ridge

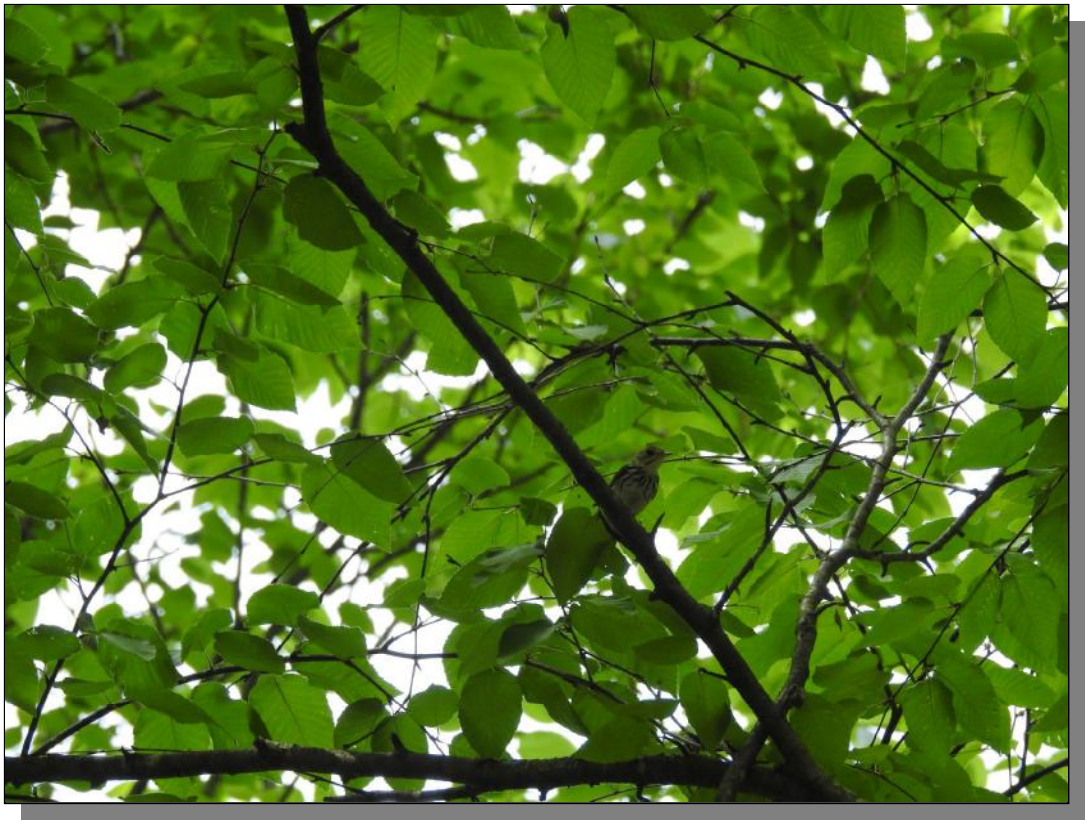


Photo C-17: Ovenbird; central section of site

Photo C-14: Black and White warbler; Eversource ROW adjacent to site.

Photo C-13: Louisiana waterthrush fledgling from Wetland Unit A3

Photo C-14: Wood thrush fledgling; eastern forested ridge

Photo C-21: Catbird; near Wetland Unit A1

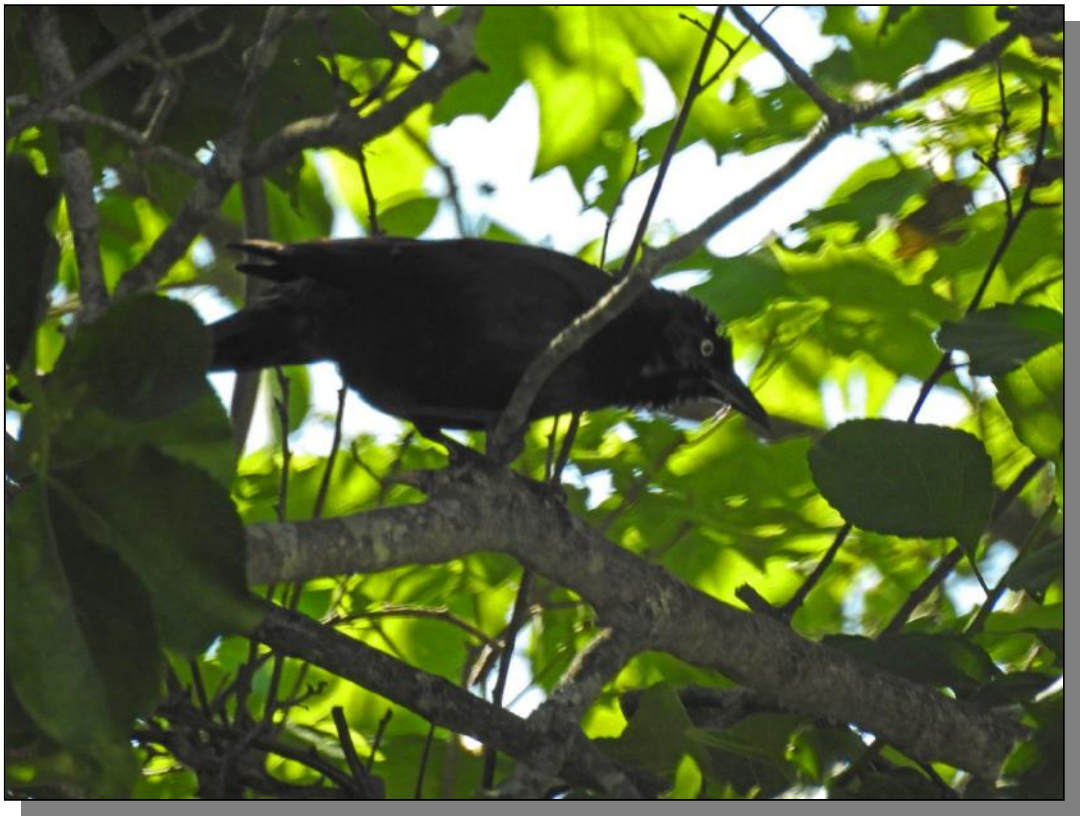


Photo C-22: Grackle; near existing house

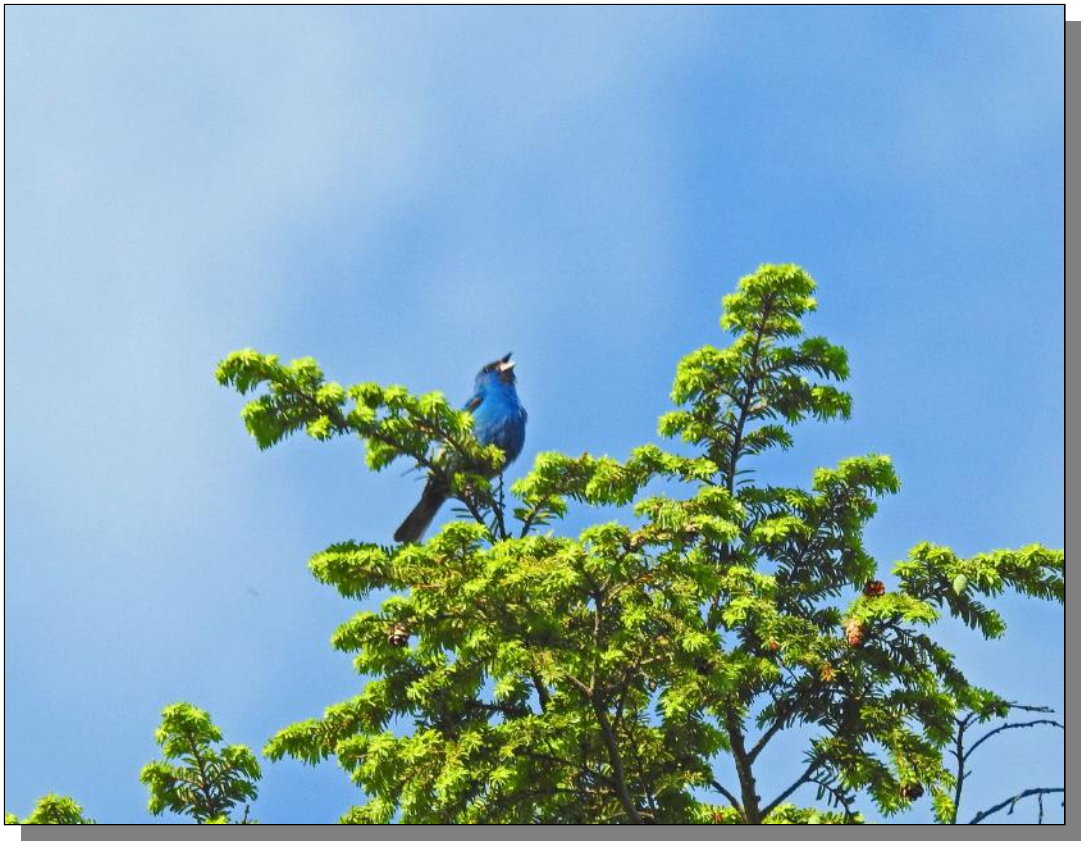


Photo C-23: Indigo bunting

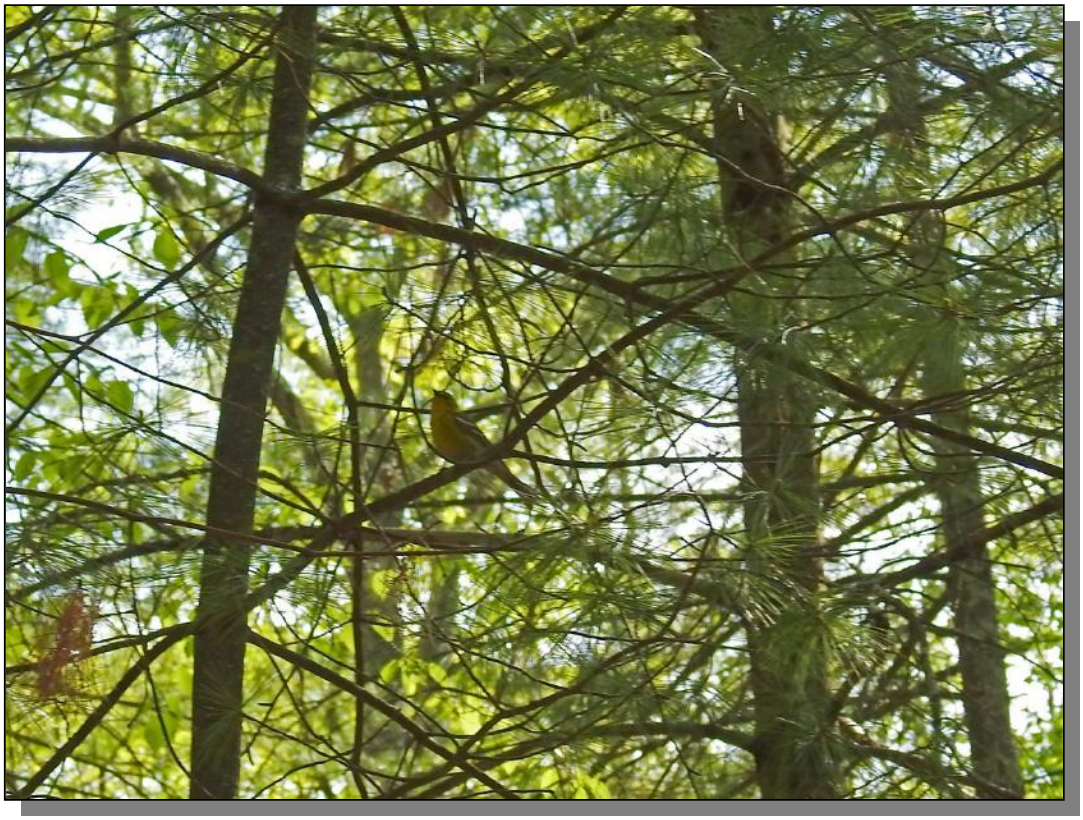


Photo C-24: Pine warbler

Photo C-25: Yellow warbler; Switchyard Site

Photo C-26: Towhee; Switchyard Site

Photo C-27: Song sparrow; Switchyard Site

Photo C-28: Brown-headed cowbird; near existing residence

Photo C-29: Kingbird; Switchyard Site

Photo C-30: Mourning doves; near existing residence

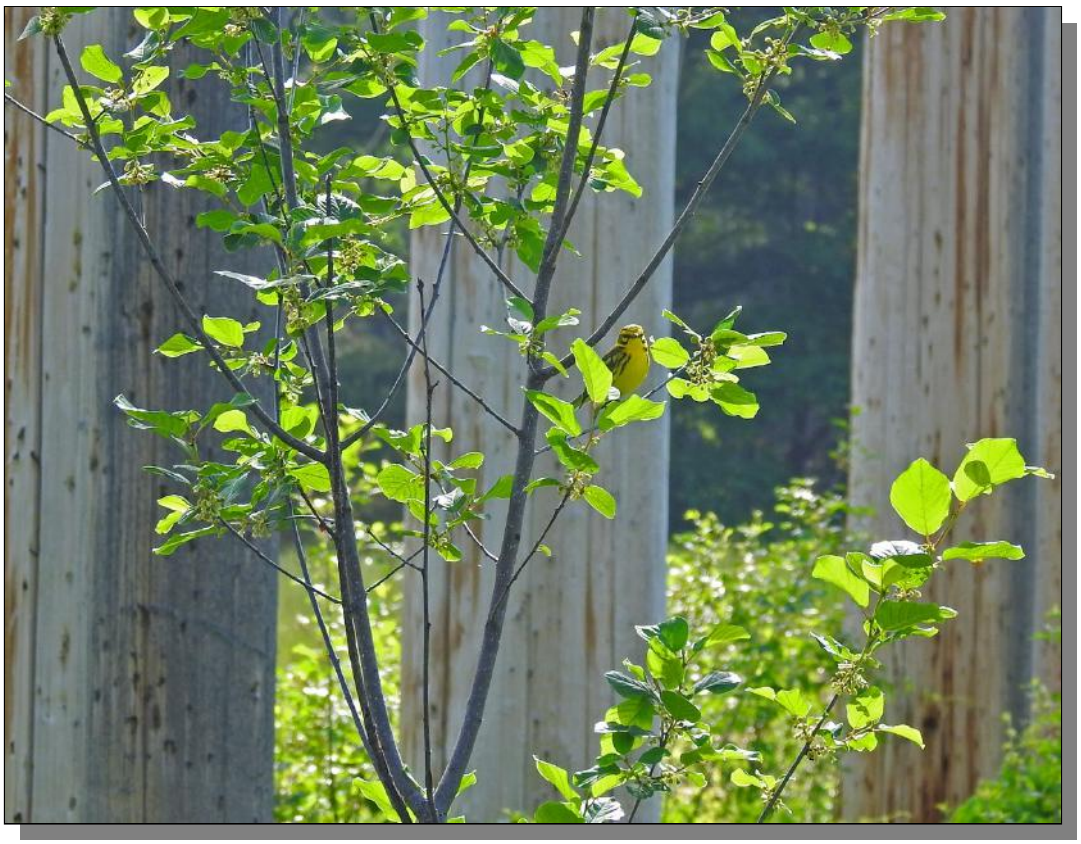


Photo C-30: Prairie warbler; just off-site to east of Switchyard Site

Photo D-1: Quinebaug River, facing upriver; March 24, 2016.

Photo D-2: Quinebaug River, facing downriver; March 24, 2016. Note outlet seasonal stream of Wetland Unit B entering river.

Photo D-3: Quinebaug River; July 21, 2016. Undercut banks include suitable habitat for wood turtle hibernation.

Photo D-4: Quinnebaug River, very steep banks with a negligible herb layer are expected to impede terrestrial movements of wood turtle, and to prevent them from foraging for lush herbs on the subject site, e.g. in Wetland Unit A3.

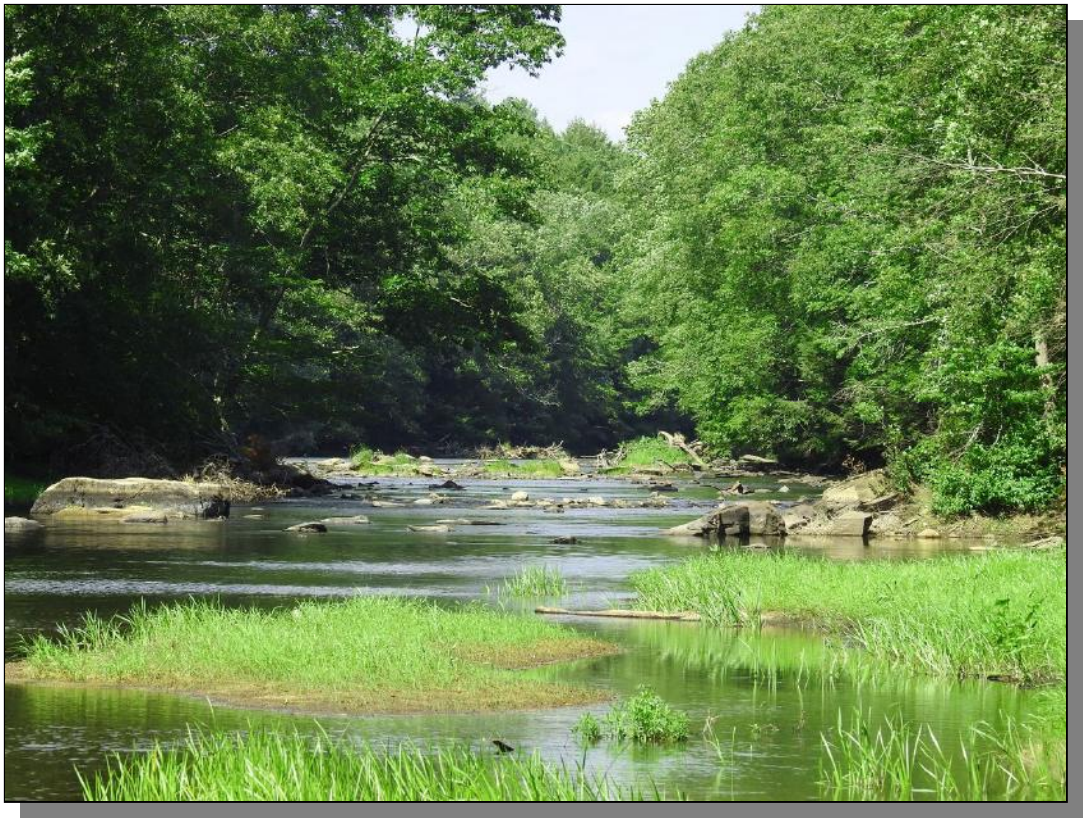


Photo D-5: Quinebaug River, facing upriver; July 21, 2016. Habitat is suitable for wood turtle, including basking sites on rocks within the river. Emergent habitat is suitable for pickerel frog.

Photo D-6: Quinebaug River, upstream view; west of KEC Site, July 21, 2016.

Photo D-7: Pickerel frog (*Lithobates palustris*) on shore of Quinebaug River; July 21, 2016; also seen on-site; e.g. Wetland Unit A-3

Photo D-8: Spring peeper (*Pseudoacris c. crucifer*) on hull of kayak at pond (Wetland Unit A1); June 10, 2016.

Photo D-7: Northern two-lined salamander (*Eurycea bislineata*) in upper portion of Wetland A2; June 10, 2016.

Photo D-8: Northern brown snake (*Storeria d. dekayi*) observed near old barn at Switchyard Site

Photo D-11: Milk snake; northern field of Switchyard Site

Other fauna observed at Killingly Energy Center, Lake Road, Killingly, CT
Photos taken February to July 2016, by REMA Ecological Services, LLC

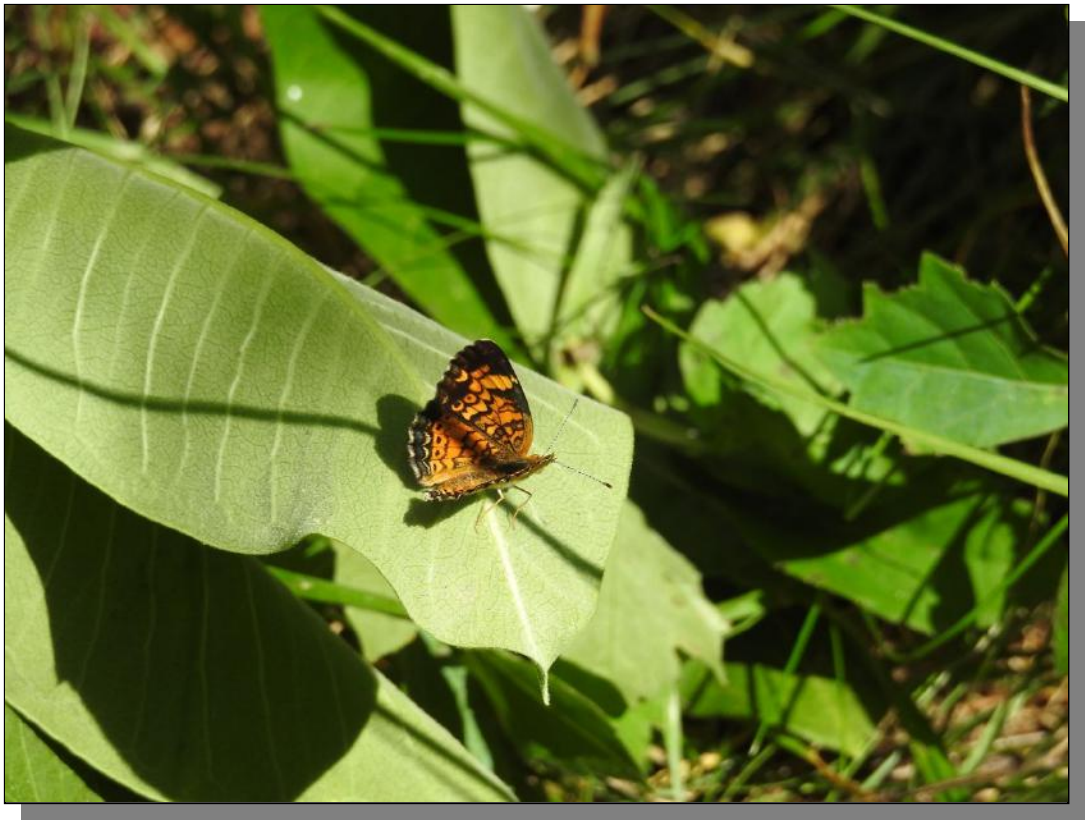


Photo E -1: Northern crescent (*Phycioides selenes*)

Photo E-2: Common buck-eye (*Junonia coenia*)

Other fauna observed at Killingly Energy Center, Lake Road, Killingly, CT
Photos taken February to July 2016, by REMA Ecological Services, LLC

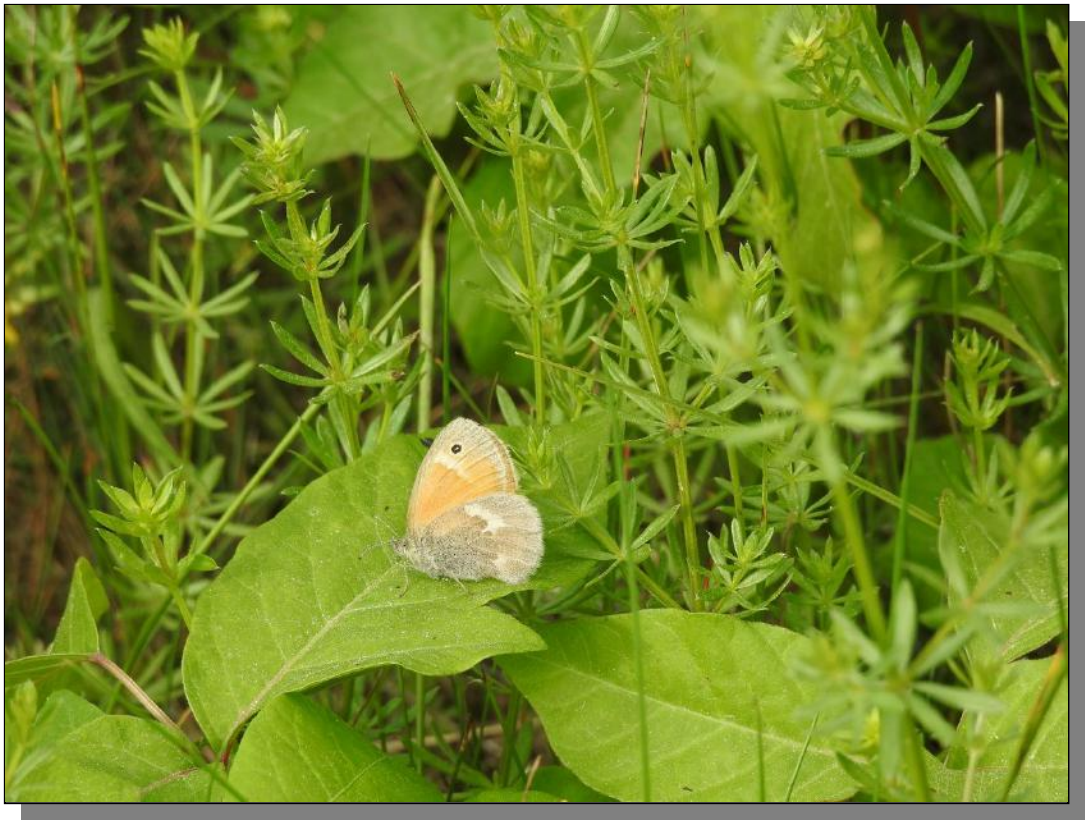


Photo E-3: Common ringlet (*Coenonympha tullia*)

Photo E-4: Common spring moth (*Heliomata cyccladata)*

Other fauna observed at Killingly Energy Center, Lake Road, Killingly, CT
Photos taken February to July 2016, by REMA Ecological Services, LLC

Photo E-5: Immature male common whitetail (*LIbellula lydia*)

Photo E-6: Calico Pennant (*Celithemis elisa)*

Other fauna observed at Killingly Energy Center, Lake Road, Killingly, CT
Photos taken February to July 2016, by REMA Ecological Services, LLC

Photo E-7: Limnephilid and odontocerid caddisflies (Trichoptera)

Photo E-8: Mayfly (Ephemeroptera*)*; from Wetland Unit A-3 spring

Photo E-9: Oligoneurid mayfly (Ephemenoptera)

Photo E-10: White faced meadow hawk (*Sympetrum obtrusum*) on barberpole sedge at pond (Wetland Unit A-1).

Photo E-11: Ebony jewelwing (*Calopteryx maculata*); from Wetland Unit A3, seasonal stream

Photo E-12: Eastern pond hawk (*Erythemis simpicollis)*; man-made pond

Other fauna observed at Killingly Energy Center, Lake Road, Killingly, CT
Photos taken February to July 2016, by REMA Ecological Services, LLC

Photo E-13: White-footed moth (*Peromyscus leucopus*)

Photo E-14: Coyote skeleton

ATTACHMENT C: Vegetative Inventory

Inventory of Vascular Plant Species Observed at the KCE Site, Lake Road, Killingly, CT

Observations April- July, 2016

Vascular Plant Inventory

SCIENTIFIC NAME	COMMON NAME	Invasive Status	FWS Indicator	WETLANDS Cover Class & Cover Estimate: Forested Wetland	Scrub-shrub	Emergent/ Meadow	UPLANDS Cover Class & Cover Estimate: Upland Grassland	Shrub/ sapling thicke	Upland Forest
TREES									
Acer rubrum	Red maple		FAC						
Acer saccharum	Sugar maple		FACU						
Amelanchier spp.	Shadbush								
Benthamidia alternifolia	Pagoda tree		FACU						
Bethamidia florida	Flowering dogwood		FACU						
Betula alleghaniensis	Yellow birch		FACU						
Betula lenta	Black birch		FACU						
Betula populifolia	Gray birch		FAC						
Carpinus caroliniana	Ironwood		FAC						
Carya glabra	Pignut hickory		FACU						
Carya ovata	Shapgbark hickory		FACU						
Hamemelis virginiana	Witch hazel		FAC						
Fagus grandifolia	American beech		FACU						
Fraxinus alba	White ash		FACU						
Fraxinus pensylvanica	Green ash		FACU						
Juniperus virginiana	Red cedar		FACU						
Populus deltoides	Cottonwood		FAC						
Populus grandidentata	Big tooth aspen		FACU						
Ostrya virginiana	Hop hornbeam		FAC						
Pinus strobus	White pine		FACU						
Prunus serotina	Black cherry		FACU						
Quercus alba	White oak		FACU						
Quercus coccinea	Scarlet oak		FACU						
Quercus palustris	Pin oak		FACW						
Quercus rubra	Northern red oak		FACU						
Quercus velutina	Black oak		FACU						
Robinia pseudo-acacia	Black locust	I	FACU						
Tsuga canadensis	Northern hemlock		FACU						
Ulmus rubra	Slippery elm		FAC						
SHRUBS									
Berberis thunbergii	Janpanese barberry	I	FACU						
Clethra alnifolia	Sweet pepperbush		FAC						
Comptonia peregrina	Sweet fern		NI						
Corylus americana	American hazelnut		FACU						
Euonymus alata	Winged euonymus	I	NI						
Frangula alnus	glossy buckthorn	I	FAC						
Gaylussaccia baccata	Black huckleberry		FACU						
Ilex verticillata	Winterberry		FACW+						
Juniper communis	Pasture juniper		FACU						
Kalmia latifolia	Mountain luarel		FACU						
Lonicera morrowii	Morrow's honeysuckle	I	NI						
Lyonia ligustrina	maleberry		FACW						
Rhodedendron periclymenoides	Pink azalea		FAC						

Table 2, continued. Vascular Plant Inventory

SCIENTIFIC NAME	COMMON NAME	Invasive Status	FWS Indicator	WETLANDS Cover Class & Cover Estimate: Forested Wetland	Scrub-shrub	Emergent/ Meadow	UPLANDS Cover Class & Cover Estimate: Upland Grassland	Shrub/ sapling thick	Upland Forest
SHRUBS, CONT.									
Rosa multiflora	Multiflora rose		FACU						
Rubus allegheniensis	Allegheny blackberry		FACU						
Rubus idaeus	Red raspperry		FACU						
Rubus occidentalis	Black raspberry		NI						
Salix discolor	Pussy willow		FACW						
Sambucus americana	Common elderberry		FACW						
Spirea latifolia	Meadowsweet		FACW						
Spirea tomentosa	Steeplebush		FACW						
Swida amomum	Silky dogwood		FACW						
Swida racemosum	Gray dogwood		FAC						
Vaccinium angustifolium	Late lowbush blueberry		FACU						
Vaccinium corymbosum	Highbush blueberry		FACW						
Vaccinium pallidum	Lowbush blueberry		NI						
Viburnum acerifolium	Maple-leaved viburnum		UPL						
Viburnum dentatum	Arrowood		FAC						
Viburnum lentago	Nannyberry		FAC						
HERBS									
Achillea millefolium	Yarrow		FACU						
Agrostis spp.	Bentgrasses								
Alliaria petiolata	Garlic mustard	I	FACU						
Anemone quinquefolia	Wood anemone		FACU						
Antennaria plantaginifolia	Plantain-leaved pussytoes		NI						
Anthoxanthu odoratum	Sweetvernal grass		FACU						
Arisaema triphyllum	Jack-in-the-pulpit		FAC						
Asclepias syriaca	Common milkweed		UPL						
Athyrium felix-femina	Lady fern		FAC						
Bidens frondosa	Beggar-ticks		FACW						
Boehmeria cylindrica	False nettle		FACW						
Cardamine impatiens	Narrow-leaved cress	I	FAC						
Cardamine pennsylvanica	Bitter cress		OBL						
Carex intumescens	Bladder sedge		FACW						
Carex folliculata	Follicled sedge		OBL						
Carex plantaginea	Sedge, glaucous,Laxiflorae		NI						
Carex sf radiata	Rose-like sedge		FAC						
Carex cf prasina	Sedge		OBL						
Carex scoparia	Broom sedge		FACW						
Carex stricta	Tussock sedge		OBL						
Carex swannii	Swann's sedge		FACU						
Chimaphila maculata	Spotted wintergreen		NI						
Chelone glabra	Turltehead		OBL						
Chrysosplenium americanum	Golden saxifrage		OBL						
Dactylis glomerata	Orchard grass		FACU						
Dendrolycopodium obscurum	Princess pine		FACU						
Dennstaedtia punctilobula	Hayscented fern		UPL						
Dichanthelium dichotomum	Panic grass		FAC						
Dicanthelium spp.	Panic grass		FAC						
Diphasiastrum digitatum	Ground cedar		FACU						

Table 2, continued. Vascular Plant Inventory

SCIENTIFIC NAME	COMMON NAME	Invasive Status	FWS Indicator	WETLANDS Cover Class & Cover Estimate: Forested Wetland	Scrub-shrub	Emergent/ Meadow	UPLANDS Cover Class & Cover Estimate: Upland Grassland	Shrub/ sapling thicke	Upland Forest
HERBS, CONT.									
Dryopteris intermedia	Evergreen woodfern		FAC						
Dryopteris marginalis	Marginal wood fern		FACU						
Dryopteris spinulosa	Spinulose woodfern		FACW						
Eleocharis obtusa	Blunt spikerush		OBL						
Epilobium coloratum	Purple-leaved willow-herb		OBL						
Eupatorium maculatum	Spotted joe-pye-weed		FACW						
Eupatorium perfoliatum	Boneset		FACW+						
Eurybia divaricata	White wood aster		NI						
Fallopia japonica	Japanese knotweed	I	FACU						
Festuca rubra	Red fescue		FACU						
Festuca spp.	Fescues								
Galium asprellum	Bristly bedstraw		OBL						
Galium mollugo	Madder		NI						
Galium palustre	Marsh bedstraw		OBL						
Galium trifidum	Fragrant bedstraw		FACW						
Gaultheria procumbens	Wintergreen		FACU						
Geum canadense	White avens		FAC						
Glyceria melicaria	Northeastern mannagrass		OBL						
Glyceria striata	fowl mannagrass		OBL						
Hieraceum spp	Hawkweeds								
Hypericum perforatum	Common St John'swort		UPL						
Impatiens capensis	Jewelweed		FACW						
Juncus effusus	Soft rush		FACW						
Leersia oryzoides	Rice cut-grass		OBL						
Lemna spp.	Duckweeds		OBL						
Leonurus cardica	Motherwort		NI						
Leptochloa fusca fascicularis	Sprangletop grass		NI						
Lycopodium clavatum	Staghorn clubmoss		FAC						
Lycopus uniflorus	Northern bugle		OBL						
Lycopus virginicus	Virginia water horehound		OBL						
Lysimachia quadrifolia	Whorled loosestrife		FACW+						
Maianthemum canadense	Canada mayflower		FACU						
Maianthemum racemosum	False solomon's seal		FACU						
Mediola virginiana	Cucumber root		FACU						
Mimulus ringens	Monkeyflower		OBL						
Mitchella repens	Partirdgeberry		FACU						
Nuphar variegata	Yellow pond lily		OBL						
Onoclea sensibilis	Sensitive fern		FACW						
Osmunda cinnamomea	Cinnamon fern		FACW						
Osmunda regalis	Royal fern		OBL						
Panax trifolius	Dwarf ginseng		NI						
Panicum clandestinum	Deer tongue grass		FACW						
Parathelypteris noveborecensis	New York fern		FACW						
Persicara spp.	Smartweeds								
Phleum canadense	Timothy		NI						
Pilea pumila	Clearweed		FACW						
Platantherea clavellata	Green wood orchis		FACW						
Polygonatum biflorum	King solomon's seal		FACU						

Table 2, continued. Vascular Plant Inventory

SCIENTIFIC NAME	COMMON NAME	Invasive Status	FWS Indicator	WETLANDS Cover Class & Cover Estimate: Forested Wetland	Scrub-shrub	Emergent/ Meadow	UPLANDS Cover Class & Cover Estimate: Upland Grassland	Shrub/ sapling thick	Upland Forest
HERBS, CONT.									
Polypodium virginianum	Rock polypody		NI						
Potentilla canadensis	Canada cinquefoil		NI						
Potentilla simplex	Common cintquefoil		FACU						
Ranuculus recurvatus	Hooked buttercup		FACW						
Rudbeckia hirta	Black-eyed Susan		FACU						
Schyzachyrium scoparium	Little blue stem grass		FACU						
Solidago altissima	Tall goldenrod		FACU-						
Solidago rugosa	Rough-stem goldenrod		FAC						
Scirpus microcarpus	Barber pole sedge		OBL						
Sphagnum spp.	Sphagnum moss								
Symphiotrichum spp.	Aster species.								
Symplocarpus foetidus	Skunk-cabbage		OBL						
Trientalis borealis	American starflower		FAC						
Trifolium spp.	Clovers								
Trifolium pratense	Red clover		FACU-						
Trillium erectum	Red trillium		FACU-						
Uvularia sessilifolia	Sessile-leaf bellwort		FACU-						
Veratrum viride	False hellebore		FACW						
Verbena urticfolia	White verbena		FAC						
Veronica officinalis	Common speedwell		FACU						
Viccia cracca	Cow vetch		NI						
Viola blanda	Sweet white violet		FACW						
Viola cucullata	Marsh blue violet		FACW						
Viola odorata	English violet		NI						
Viola pallens	Smooth white violet		OBL						
VINES									
Calystegia sepia	Field bindweed		FAC						
Celastrus orbiculatus	Asiatic bittersweet		UPL						
Clematis virginiana	Virgin's bower		FAC						
Lonicera japonica	Japanese honeysuckle	I	FACU						
Rubus hispidus	Bristly dewberry		FACW						
Rubus flagellaris	Prickly dewberry		FACU						
Smilax rotundifolia	Common greenbrier		FAC						
Toxicodendron radicans	Poison ivy		FAC						

NOTES:
I = PRIORITY INVASIVE IN CT

WETLAND INDICATOR STATUS

almost always found in wetlands	OBL
most likely to be found in wetlands	FACW
most likely to be found in uplands	FACU
equally likely, wetlands & uplands	FAC
Occurs only in wetlands	UPL
Has no indicator status	NI (most are upland species)

COVER CODES

25-100%	HIGH
5-25%	MODERATE
1-5%	LOW
<1%	SPARSE

NOTE: Cover class shown in table is that of the cover type variant where species is best represented. For example, cover class of rock polypody *(Polypodium virginianum)* is "1 -5%", which is its cover in rocky evergreen-deciduous forest. However, if cover were averaged over all forest cover types on the site, it would be under 1%. Survey was of low to medium intensity.

ATTACHMENT D: Breeding Bird Survey

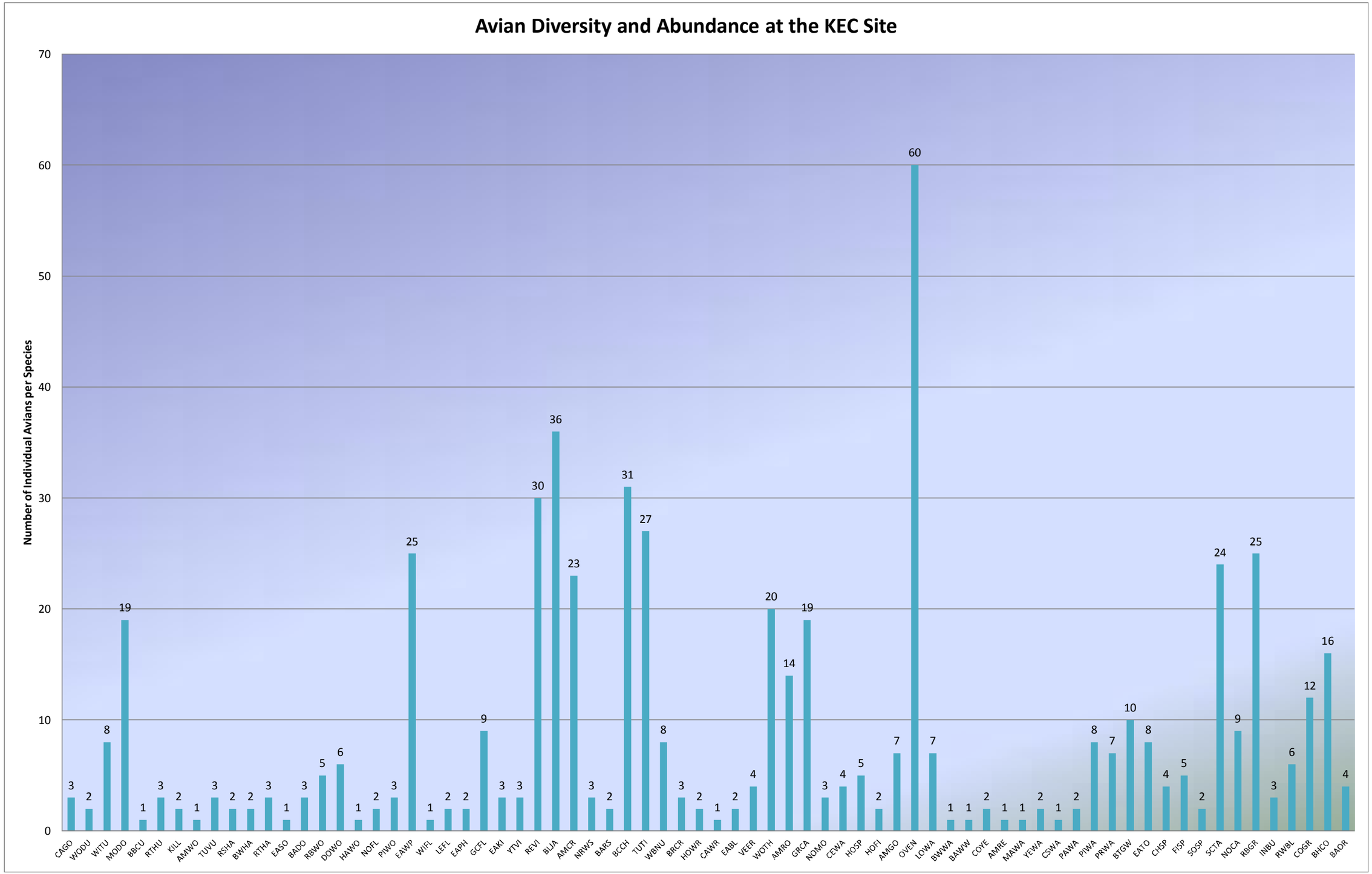

Avian Diversity and Abundance at the KEC Site
Number of Individual Avians per Species
0
10
20
30
40
50
60
70
CAGO 3
WODU 2
WITU 8
MODO 19
BBCU 1
RTHU 3
KILL 2
AMWO 1
TUVU 3
RSHA 2
BWHA 2
RTHA 3
EASO 1
BADO 3
RBWO 5
DOWO 6
HAWO 1
NOFL 2
PIWO 3
EAWP 25
WIFL 1
LEFL 2
EAPH 2
GCFL 9
EAKI 3
YTVI 3
REVI 30
BLJA 36
AMCR 23
NRWS 3
BARS 2
BCCH 31
TUTI 27
WBNU 8
BRCR 3
HOWR 2
CAWR 1
EABL 2
VEER 4
WOTH 20
AMRO 14
GRCA 19
NOMO 3
CEWA 4
HOSP 5
HOFI 2
AMGO 7
OVEN 60
LOWA 7
BWWA 1
BAWW 1
COYE 2
AMRE 1
MAWA 1
YEWA 2
CSWA 1
PAWA 2
PIWA 8
PRWA 7
BTGW 10
EATO 8
CHSP 4
FISP 5
SOSP 2
SCTA 24
NOCA 9
RBGR 25
INBU 3
RWBL 6
COGR 12
BHCO 16
BAOR 4

TABLE A: June 2016 Breeding Bird Survey using the Modified Ontario Point Census Method (CT DEEP) at the Killingly Energy Center Site, Lake Road, Killingly, CT

			Point 1		Point 2		Point 3		Point 4		Point 5		Point 6		Point 7		Point 8		Point 9		Point 10		Point 11		Point 12		Point 13		Point 14			
Species	**Bird ID**	**Date**	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/19/16	06/04/16	06/19/16	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/10/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	**Other ***	**Total**
Canada goose *(Branta canadensis)*	CAGO																														3	**3**
Wood duck *(Aix sponsa)*	WODU																														2	**2**
Wild Turkey *(Meleagris gallopavo)*	WITU																														8	**8**
Mourning Dove *(Zenaida macroura)*	MODO						1					1			1		1	2	1	1	1					1	1	3		2	3	**19**
Black-billed Cuckoo *(Coccyzus erythropthalmus)*	BBCU																														1	**1**
Ruby-throated Hummingbird *(Archilochus colubris)*	RTHU																														3	**3**
Killdeer *(Charadrius vociferus)*	KILL																														2	**2**
American Woodcock *(Scolopax minor)*	AMWO																														1	**1**
Turkey vulture *(Cathartes aura)*	TUVU																												1		2	**3**
Red-shouldered Hawk *(Buteo lineatus)*	RSHA																														2	**2**
Broad-winged Hawk *(Buteo platyperus)* **(SC)**[1]	BWHA																														2	**2**
Red-tailed Hawk *(Buteo jamaicensis)*	RTHA																														3	**3**
Eastern Screech-Owl *(Megascops asio)*	EASO																														1	**1**
Barred Owl *(Strix varia)*	BADO																														3	**3**
Red-bellied Woodpecker *(Melanerpes carolinus)*	RBWO				1	1									1	1															1	**5**
Downy Woodpecker *(Picoides pubescens)*	DOWO											1	1							1						1					2	**6**
Hairy Woodpecker *(Picoides villosus)*	HAWO																														1	**1**
Northern Flicker *(Colaptes auratus)*	NOFL																														2	**2**
Pileated Woodpecker *(Dryocopus pileatus)*	PIWO					1																									2	**3**
Eastern Wood-Pewee *(Contopus virens)*	EAWP			1	1	1	3	2	1	2	2			3		2	1	3								1					2	**25**
Willow Flycatcher *(Empidonax traillii)*	WIFL																														1	**1**
Least Flycatcher (*Empidonax minimus*)	LEFL																														2	**2**
Eastern Phoebe *(Sayornis phoebe)*	EAPH			1																											1	**2**
Great Crested Flycatcher *(Myiarchus crinitus)*	GCFL		1																	1		1			1	1		1	1		2	**9**
Eastern Kingbird *(Tyrannus tyrannus)*	EAKI																												1		2	**3**
Yellow-throated Vireo *(Vireo flavifrons)*	YTVI																											1	1		1	**3**
Red-eyed Vireo *(Vireo olivaceus)*	REVI		3	1	1		2		2	1		3	3		2	2	1	1		1	1	2	1		1						2	**30**
Blue Jay *(Cyanocitta cristata)*	BLJA			3		1	2	2	1		1	1		4				2	1		1		1		1	1	2	4	1	2	5	**36**
American Crow *(Corvus brachyrhynchos)*	AMCR		1	1	1	1		1		1	1		4		3	1	1	1								1			1		4	**23**
N. Rough-winged Swallow *(Stelgidopteryx serripennis)*	NRWS																														3	**3**
Barn Swallow *(Hirundo rustica)*	BARS																														2	**2**
Black-capped Chickadee *(Poecile atricapillus)*	BCCH			1	2		1		3		3	2	3	1	1	2		1						1		3		2			5	**31**
Tufted Titmouse *(Baeolophus bicolor)*	TUTI		1	2	1	1		1	3		3	2	1				1								1		2				8	**27**
White-breasted Nuthatch *(Sitta carolinensis)*	WBNU																		1		3	1						1			2	**8**
Brown Creeper (*Certhia americana*)	BRCR											1																			2	**3**
House Wren *(Troglodytes aedon)*	HOWR																														2	**2**
Carolina Wren *(Thryothorus ludovicianus)*	CAWR																														1	**1**
Eastern Bluebird *(Sialia sialis)*	EABL																														2	**2**
Veery *(Catharus fuscescens)*	VEER											2														1					1	**4**
Wood Thrush *(Hylocichla mustelina)*	WOTH		1				2		2	1	1				3	1	2			1	1	1				1					3	**20**
American Robin *(Turdus migratorius)*	AMRO		3	4	2																									1	4	**14**
Gray Catbird *(Dumetella carolinensis)*	GRCA			2	1										1												3	2	1	3	6	**19**
Northern Mockingbird (Mimus polyglottos)	NOMO																											1		1	1	**3**
Cedar Waxwing *(Bombycilla cedrorum)*	CEWA						1		2																						1	**4**
House Sparrow (*Passer domesticus*)	HOSP																														5	**5**

TABLE A: June 2016 Breeding Bird Survey using the Modified Ontario Point Census Method (CT DEEP) at the Killingly Energy Center Site, Lake Road, Killingly, CT *(continued)*

			Point 1		Point 2		Point 3		Point 4		Point 5		Point 6		Point 7		Point 8		Point 9		Point 10		Point 11		Point 12		Point 13		Point 14			
Species	**Bird ID**	**Date**	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/19/16	06/04/16	06/19/16	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/10/16	06/04/16	06/10/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	06/10/16	06/19/16	**Other ***	**Total**
House Finch *(Haemorhous mexicanus)*	HOFI																														2	**2**
American Goldfinch *(Spinus tristis)*	AMGO																														7	**7**
Ovenbird *(Seiurus aurocapilla)*	OVEN		2	2	2	1	2	2	4	2	3	4	4	4	1	4	1	3	2	1	2	2	1	2	3	2		1			3	**60**
Louisiana Waterthrush *(Parkesia motacilla)*	LOWA											2								1	1		2								1	**7**
Blue-winged Warbler *(Vermivora cyanoptera)*	BWWA																														1	**1**
Black-and-white Warbler *(Mniotilta varia)*	BAWW																														1	**1**
Common Yellowthroat *(Geothlypis trichas)*	COYE																												1		1	**2**
American redstart (Setophaga ruticilla)	AMRE																														1	**1**
Magnolia warbler *(Setophaga magnolia)*	MAWA																														1	**1**
Yellow Warbler *(Setophaga petechia)*	YEWA																														2	**2**
Chestnut-sided Warbler (*Setophaga pensylvanica*)	CSWA																														1	**1**
Palm Warbler *(Setophaga palmarum)*	PAWA																														2	**2**
Pine Warbler *(Setophaga pinus)*	PIWA						1		1	1							1		1												3	**8**
Prairie Warbler *(Setophaga discolor)*	PRWA																											2	1	2	2	**7**
Black-throated Green Warbler *(Setophaga virens)*	BTGW												1										3	2	1	1					2	**10**
Eastern Towhee *(Pipilo erythrophthalmus)*	EATO				1		1																				1	1	1	1	2	**8**
Chipping Sparrow *(Spizella passerina)*	CHSP																		1		1	1									1	**4**
Field Sparrow *(Spizella pusilla)*	FISP																												1	3	1	**5**
Song Sparrow *(Melospiza melodia)*	SOSP																														2	**2**
Scarlet Tanager *(Piranga olivacea)*	SCTA		1				1		2	1	2	1	2	2	1	2	1	1	1	1	1	1	1			1					1	**24**
Northern Cardinal *(Cardinalis cardinalis)*	NOCA		1		1		1								1	1														2	2	**9**
Rose-breasted Grosbeak (*Pheucticus ludovicianus)*	RBGR		2	1	2	1				1	1		2	2	2	2	2	2		1					1					1	2	**25**
Indigo Bunting *(Passerina cyanea)*	INBU																											1		1	1	**3**
Red-winged Blackbird *(Agelaius phoeniceus)*	RWBL																												2	2	2	**6**
Common Grackle *(Quiscalus quiscula)*	COGR																								1	2				3	6	**12**
Brown-headed Cowbird *(Molothrus ater)*	BHCO		2	2			1	1		1										1	2							1			5	**16**
Baltimore Oriole *(Icterus galbula)*	BAOR																					1						1	1		1	**4**
																											GRAND TOTAL					***582***
																											TOTAL AVIAN SPECIES					***72***

Notes: Bird survey/census conducted by George Logan and Jonathan Trouern-Trend

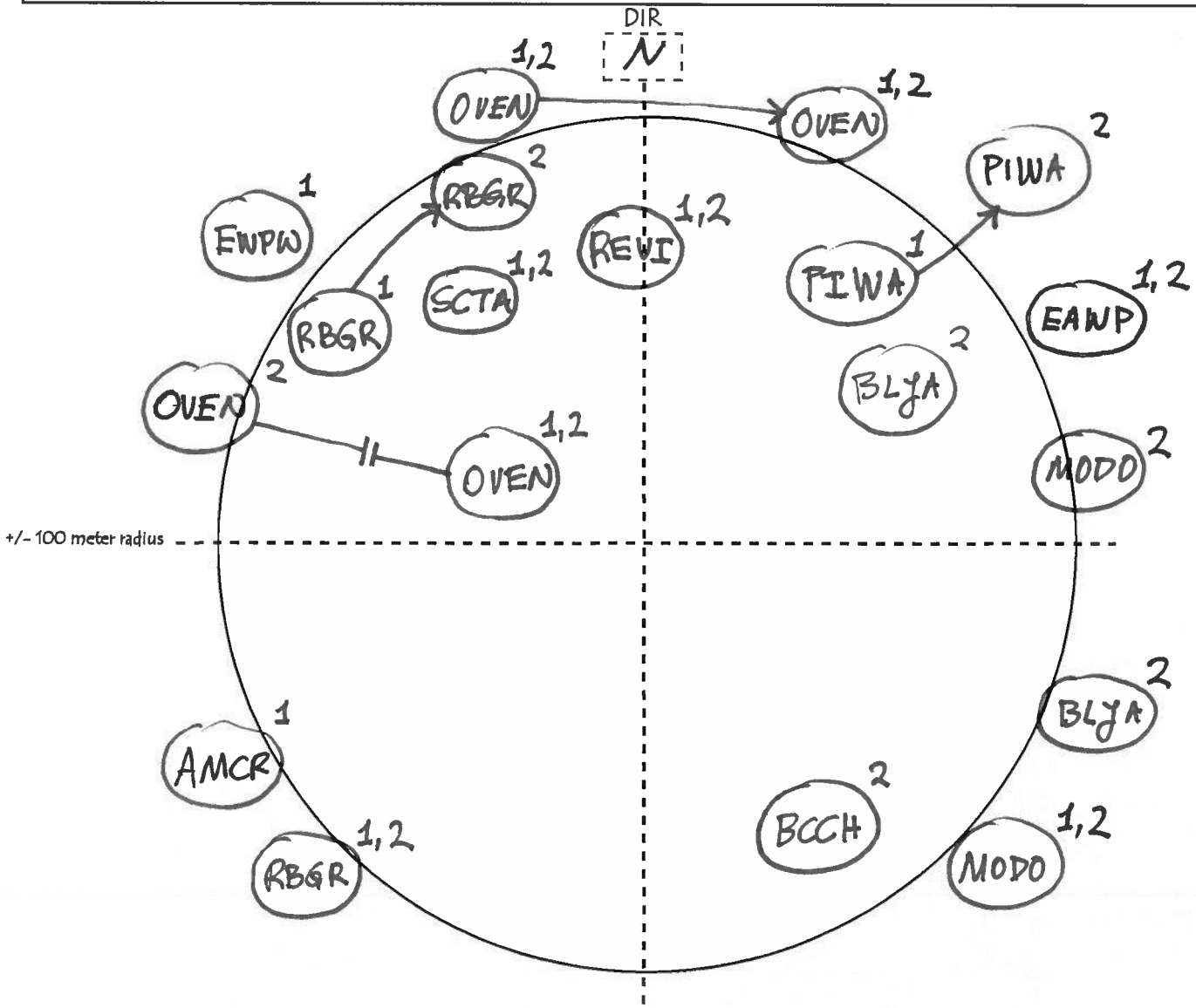
Common and scientific names are in accordance with 57th AOU Supplement (2016) of the American Ornithological Union's Checklist of North & Middle American Birds (7th Edition)

***** Species observed on site but not on point during survey; number indicates total individuals observed; likely includes observations of the same individuals on: June 4th, 10th, 12th, 13th, and 19th, 2016.

[1] Listed as Species of Special Concern (SC) in Connecticut's Endangered, Threatened, and Special Concern Species (CT DEEP 2015)

AVIAN INVENTORY
POINT COUNT LOCATION MAPPING
(10 Minute Count)

PROJECT NAME & LOCATION: Killingly Energy Center, Lake Road, Killingly, CT
STATION: AP-8
DATE: 6-10-16 START TIME: 5:58 AM
OBSERVER: G. T. LOGAN



Singing position of male

Simultaneous song of two males

Known change in position

NOTES:
- Partly cloudy
- Road traffic audible - L-M

ATTACHMENT E:Wildlife Inventory

Attachment E - Table A-1

Breeding Birds Recorded or Expected at the Proposed Killingly Energy Center (KEC)

Town of Killingly, Windham County, Connecticut

Common Name[1]	Scientific Name	Breeding Bird Record?[2]	Observed at Site?[3]	Listed?[4]	Location/Notes
Canada goose	*Podilymbus podiceps*	X	X		Flyover
Wood duck	*Aix sponsa*	X	X		At man-made pond; WA1
Mallard	*Anas platyrhynchos*	X			Probable user
Northern bobwhite	*Colinus virginianus*	X			Possible habitat in electric ROW
Ruffed grouse	*Bonasa umbellus*	X			Possible breeder
Wild turkey	*Meleagris gallopavo*	X	X		Female/fledglings; Switchyard Site
Rock pigeon	*Columba livia*	X			Possible user
Mourning dove	*Zenaida marcoura*	X	X		Common
Black-billed cuckoo	*Coccyzus erythrophthalmus*	X	X		Switchyard Site (SS)
Yellow-billed cuckoo	*Coccyzus americanus*	X			Possible breeder
Chimney Swift	*Chaetura pelagica*	X			Probable user
Ruby-throated hummingbird	*Archilochus colubris*	X	X		
Killdeer	*Charadrius vociferous*	X	X		SS
American woodcock	*Scolopax minor*	X	X		SS
Turkey vulture	*Cathartes aura*	X	X		Flyover
Cooper's hawk	*Accipiter cooperii*	X			Possible breeder
Red-shouldered hawk	*Buteo lineatus*	X	X		N. section of Generating Facility Site (GFS)
Broad-winged hawk	*Buteo platypterus*	X	X	SPEC	
Red-tailed hawk	*Buteo jamaicensis*	X	X		Both SS and GFS
Eastern screech owl	*Ottus asio*	X	X		SS

[1] Common and scientific names according to AOU (7th Edition) and supplements through 2016 (57th)
[2] Recorded in any of eight adjacent blocks of the Atlas of Breeding Birds of Connecticut (1994), centered on the block for the subject site, for which preferred habitat exists on-site or immediately adjacent. Date is supplemented by recent BBS data for a nearby route (i.e., Woodstock, CT). Author has included additional species for which sufficient habitat exists, which have been recorded elsewhere in Windham County, or species observed during migration.
[3] Observed during the following field survey dates: May 4th, 20th, and 26th, and June 4th, 10th, 12th, 13th, and 19th, 2016
[4] CT State-Listed: END = Endangered, THR = Threatened, SPEC = Special Concern

Attachment E - Table A-1 *(cont.)*

Common Name	Scientific Name	Breeding Bird Record?	Observed at Site?	Listed?	Location/Notes
Great horned owl	*Bubo virginianus*	X			Possible user
Barred owl	*Strix varia*	X	X		GFS
Red-bellied woodpecker	*Melanerpes carolinus*	X	X		
Downy woodpecker	*Picoides pubescens*	X	X		
Hairy woodpecker	*Picoides villosus*	X	X		
Northern flicker	*Colaptes auratus*	X	X		
Pileated woodpecker	*Dryocopus pileatus*	X	X		
American kestrel	*Falco sparverius*	X		SPEC	
Eastern wood-pewee	*Contopus virens*	X	X		Common in wooded areas
Willow flycatcher	*Empidonax traillii*	X	X		SS
Alder flycatcher	*Empidonax alnorum*	X			Possible breeder; likely off-site
Least flycatcher	*Empidonax minimus*	X	X		SS
Eastern phoebe	*Sayornis phoebe*	X	X		
Great crested flycatcher	*Myiarchus crinitues*	X	X		SS and GFS
Eastern kingbird	*Tyrannus tyrannus*	X	X		SS
White-eyed vireo	*Vireo griseus*	X			Possible breeder
Yellow-throated vireo	*Vireo flavifrons*	X	X		SS
Warbling vireo	*Vireo gilvus*	X			Possible breeder
Red-eyed vireo	*Vireo olivaceous*	X	X		Common
Blue jay	*Cyanocitta cristata*	X	X		Common
Common Raven	*Corvus corax*				Range is increasing; based on habitat
American crow	*Corvus brachyrhynchos*	X	X		Common
Tree swallow	*Tachycineta bicolor*	X			Probable user
N. rough-winged swallow	*Stelgidopteryx serripennis*	X	X		Flyover; SS
Bank swallow	*Riparia riparia*	X			Possible user
Barn swallow	*Hirundo rustica*	X	X		SS
Black-capped chickadee	*Poecile atricapillus*	X	X		common
Tufted titmouse	*Baelophus bicolor*	X	X		common
Red-breasted nuthatch	*Sitta canadensis*	X			Probable breeder

Attachment E - Table A-1 *(cont.)*

Common Name	Scientific Name	Breeding Bird Atlas Record?	Observed at Site?	Listed?	Location/Notes
White-breasted nuthatch	*Sitta carolinensis*	X	X		GFS
Brown creeper	*Certhia americana*	X	X		GFS
House wren	*Troglodytes aedon*	X	X		Near existing house
Carolina wren	*Thryothorus ludovicianus*	X	X		Near existing house and barn
Blue-gray gnatcatcher	*Polioptila caerulea*	X			Probable breeder
Eastern bluebird	*Sialia sialis*	X	X		SS
Veery	*Catharus fuscescens*	X	X		
Hermit thrush	*Catharus guttatus*	X			Possible breeder
Wood thrush	*Hylocichla mustelina*	X	X		
American robin	*Turdus migratorius*	X	X		common
Gray catbird	*Dumetella carolinensis*	X	X		
Northern mockingbird	*Mimus polyglottos*	X	X		
European starling	*Sturnus vulgaris*	X			Probable breeder or user
Cedar waxwing	*Bombycilla cedrorum*	X	X		
House sparrow	*Passer domesticus*	X	X		At existing house bird feeder
House finch	*Carpodacus mexicanus*	X	X		
Purple finch	*Carpodacus purpureus*	X			Possible breeder
American goldfinch	*Carduelis tristis*	X	X		SS and nearby
Ovenbird	*Seiurus aurocappillus*	X	X		Most common bird in wooded areas
Louisiana waterthrush	*Parkesia motacilla*	X	X		
Northern waterthrush	*Parkesia noveboracensis*	X			Suitable habitat at GFS
Blue-winged warbler	*Vermivora cyanoptera*	X	X		SS
Black-and-white warbler	*Mniotilta varia*	X	X		
Common yellowthroat	*Geothlupis trichas*	X	X		SS
American redstart	*Setophaga ruticilla*	X	X		SS, wooded southern section
Magnolia warbler	*Dendroica magnolia*		X		Late migrant
Yellow warbler	*Dendroica petechial*	X	X		SS and nearby
Chestnut sided warbler	*Dendroica pensylvanica*	X	X		SS and nearby
Palm warbler	*Dendroica palmatorum*		X		Migrant

Attachment E - Table A-1 *(cont.)*

Common Name	Scientific Name	Breeding Bird Atlas Record?	Observed at Site?	Listed?	Location/Notes
Pine warbler	*Dendroica pinus*	X	X		
Yellow-rumped warbler	*Dendroica coronata*	X			Possible but unlikely breeder
Prairie warbler	*Dendroica discolor*	X	X		SS and ROW nearby
Black-throated green warbl.	*Dendroica virens*	X	X		GFS; northern section mostly
Canada warbler	*Wilsonia canadensis*	X			Possible breeder
Wilson's warbler	*Wilsonia pusilla*	X			Likely migrant
Eastern towhee	Pipilo erythrophthalmus	X	X		SS
Chipping sparrow	*Spizella passerine*	X	X		
Field sparrow	*Spizella pusilla*	X	X		Just off-site of SS in ROW
Song sparrow	*Melospiza melodia*	X	X		
Scarlet tanager	*Piranga olivacea*	X	X		GFS
Northern cardinal	*Cardinalis cardinalis*	X	X		
Rose-breasted grosbeak	*Pheucticus ludovicianus*	X	X		
Indigo bunting	*Passerina cyanea*	X	X		SS
Red-winged blackbird	*Agelaius phoeniceus*	X	X		SS and nearby
Common grackle	*Quiscalus quiscula*	X	X		
Brown-headed cowbird	*Molothrus ater*	X	X		
Baltimore oriole	*Icterus galbula*	X	X		

Attachment E - Table A-2

Amphibians Recorded or Expected at the Proposed Killingly Energy Center (KEC)

Town of Killingly, Windham County, Connecticut

Common Name[5]	Scientific Name	Nearby Record?[6]	Observed at Site?[7]	Listed?[8]	Location/Notes
Spotted salamander	*Ambystoma maculatum*	X	X		GFS; breeding at Wetland Unit B (WB)
Northern dusky salamander	*Desmognathus fuscus*	X			Possible
N. redback salamander	*Plethodon c. cinereus*	X	X		Throughout forest areas
Four-toed salamander	*Hemidactylium scutatum*	X			Possible; searched for but not observed
N. two-lined salamander	*Eurycea bislineata*	X	X		Wetland Unit A2 and A3 streams
Eastern American Toad	*Bufo. a. americanus*	X	X		Wetlands A1, A2, and A3; also at SS
Gray treefrog	*Hyla versicolor*	X	X		GFS only; wetlands
Northern spring peeper	*Pseudacris c. crucifer*	X	X		WB
Bullfrog	*Rana catesbeiana*	X	X		Wetland Unit A1 (tadpole only)
Green frog	*Rana clamitans melanota*	X	X		Wetland Unit A1 and seasonal streams
Wood frog	*Rana sylvatica*	X	X		Breeding at Wetland Unit B
Pickerel frog	*Rana palustris*	X	X		Wetland Units A1 and A3
Wood turtle	*Glyptemys insculpta*	X		SPEC	CT NDDB record; not likely on site
Eastern box turtle	*Terrapene c. carolina*	X		SPEC	CT NDDB record; possibly at site
Northern brown snake	*Storeria d. dekayi*	X	X		Old barn; Switchyard Site (SS)
Northern redbelly snake	*Storeria o. occipitomaculata*	X			Possible
Common garter snake	*Thamnophis sirtalis*	X	X		GFS and SS
Northern ringneck snake	*Diadophis punctatus edwardsii*	X	X		Northern section of GFS
Northern black racer	*Culuber c. constrictor*	X			Possible but unlikely
Eastern milk snake	*Lampropeltis t. triangulum*	X	X		SS

[5] Common and scientific names according to Klemens (1993)

[6] Recorded in Killingly or in surrounding towns (e.g., Klemens 1993). Author has included additional species for which sufficient habitat exists, and which have been recorded elsewhere in Windham County.

[7] Observed during the following field survey period: March to July 2016.

[8] CT State-Listed: END = Endangered, THR = Threatened, SPEC = Special Concern

Attachment E - Table A-3

Mammals whose range encompasses or have been observed at the Killingly Energy Center Site

Town of Killingly, Windham County, Connecticut

Common Name[9]	Scientific Name	Site in Range?[10]	Observed at Site?[11]	Listed?[12]	Location/Notes
Virginia opossum	*Didelphis virginiana*	X	X		SS
Masked shrew	*Sorex cinereus*	X			Probable
Water shrew	*Sorex palustris*	X			Possible
Smoky shrew	*Sorex fumeus*	X			Possible
Northern short-tailed shrew	*Blarina brevicauda*	X			Probable
Hairy-tailed mole	*Parascalops breweri*	X			Possible
Eastern mole	*Scalopus aquaticus*	X	X		GFS, near existing home
Star-nosed mole	*Condylura cristata*	X			Probable
Little brown myotis	*Myotis lucifugus*	X	X	END	Acoustic study by Tetra Tech
Big brown bat	*Eptesicus fuscus*	X	X		Acoustic study by Tetra Tech
Eastern red bat	*Lasiurus borealis*	X	X	SPEC	Acoustic study by Tetra Tech
Hoary bat	*Lasiurus cinereus*	X	X	SPEC	Acoustic Study by Tetra Tech
Silver-haired bat	*Lasionycteris noctivagans*	X	X	SPEC	Acoustic Study by Tetra Tech
Eastern cottontail	*Sylvilagus floridanus*	X	X		GFS, near existing house; SS field
Eastern chipmunk	*Tamias striatus*	X	X		throughout
Woodchuck	*Marmota monax*	X	X		
Eastern gray squirrel	*Sciurus corolinensis*	X	X		throughout
Red squirrel	*Tamiasciurus hudsonicus*	X	X		Mixed deciduous/evergreen forest
Northern flying squirrel	*Glaucomys sabrinus*	X			Possible
Southern flying squirrel	*Glaucomys volans*	X	X		Wetland Unit A3 (edge)
Meadow jumping mouse	*Zapus hudsonius*	X	X		SS
White-footed mouse	*Peromyscus leucopus*	X	X		GFS

[9] Common and scientific names according to Whitaker and Hamilton (1998)
[10] Range as depicted in Whitaker and Hamilton (1998) and DeGraaf and Yamasaki (2001)
[11] Observed during the following field survey dates:
[12] CT State-Listed: END = Endangered, THR = Threatened, SPEC = Special Concern

Attachment E - Table A-3 *(cont.)*

Common Name	Scientific Name	Site in Range?	Observed at Site?	Listed?	Location/Notes
Deer mouse	*Peromyscus maniculatus*	X			Probable
Southern red-backed vole	*Clethrionomys gapperi*	X			Probable
Meadow vole	*Microtus pennsylanicus*	X			Probable
Woodland vole	*Microtus pinetorum*	X			Possible
Porcupine	*Erethizon dorsatum*	X	X		Probable; sign by Quinebaug River
Coyote	*Canis latrans*	X	X		GFS, including a skeleton
Red fox	*Vulpes vulpes*	X	X		SS and nearby
Gray fox	*Urocyon cinereoargenteus*	X	X		SS; (not conclusive based on tracks)
Black bear	*Ursus americanus*	X			Possible
Raccoon	*Procyon lotor*	X	X		Wetlands
Fisher	*Martes pennanti*	X	X		Heard during owl call-back survey
Short-tailed weasel	*Mustela erminea*	X			Possible
Long-tailed weasel	*Mustela frenata*	X			Probable
Striped skunk	*Memphitis memphitis*	X	X		Vicinity of existing house
Bobcat	*Lynx rufus*	X			Possible; sighting in Killingly nearby
White-tailed deer	*Odocoileus virginianus*	X	X		throughout

References:

Bevier, L.R. 1994. The Atlas of Breeding Birds of Connecticut. State Geological and Natural History Survey of Connecticut. Department of Environmental Protection, Hartford, Connecticut. Bulletin 113.

DeGraaf, R.M. and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.

Whitaker, J.O. and W.J. Hamilton. 1998. Mammals of the Eastern United States. Cornell University Press.

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APPENDI F-2 – INVERTEBRATE S RVEY

Invertebrate Survey

Killingly Energy Center
Lake Road, Killingly, Connecticut

Jonathan Trouern-Trend
for
REMA Ecological Services, LLC

August 2016

Killingly
Energy Center
an NTE Energy Project

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Appendix B List of Butterflies
Appendix C Photos

1.0 Overview

REMA Ecological Services, LLC (REMA) of Manchester, CT requested assistance in conducting a survey of moth and butterfly species at the 73-acre Lake Road site of the Killingly Energy Center (KEC, KEC Site), a proposed 550-megawatt (MW) air-cooled, combined cycle, electric generating facility and associated electrical interconnection switchyard. The purpose of the survey was to determine the presence of any of the two "state-listed" moth species and one "state-listed" butterfly species identified by the Connecticut Department of Energy & Environmental Protection's (DEEP's) Natural Diversity Database (NDDB). In addition, a representative sample of non-target Lepidoptera and other insect taxa were collected as vouchers to be deposited in the entomology collection of the University of Connecticut.

The study area is divided into two parcels: a 63-acre parcel located north of Lake Road and a 10-acre parcel located south of Lake Road. The KEC Site largely consists of dense, undeveloped woodland and wetland. One two-story house and associated facilities are located in the southeastern corner of the parcel north of Lake Road. A field and several structures are located on the northern edge of the parcel south of Lake Road. Generally, on-site soils were formed in glacial till sediments that were derived mainly from gneiss, granite, and/or schist-grade metamorphic parent material.

2.0 Survey Dates

The KEC Site was surveyed on 3 separate nights in July, 2016. These are as follows:

July 1st, from 9:00 p.m. to 12:00 a.m.,
July 18th /19th, from 8:00 p.m. to 12:30 a.m.,
July 26th, from 8:30 p.m. to 12:45 a.m.

In addition, butterfly species were observed on:

June 10th, 2016 from 8:00 a.m. to 12:00 p.m.
August 3rd, 2016 from 2:30 p.m. to 4:30 p.m.

The above dates fit well within the documented flight times of the target species.

3.0 Methods

Survey methods included the use of Ultraviolet, Mercury Vapor, and white fluorescent lights to attract insects, and searching of flower heads and ground by headlamp and sweeping.

Voucher specimens were collected for non-target species of Lepidoptera. All voucher specimens will be deposited in the collection of the University of Connecticut in Storrs as a representative sample of mid-summer night-active Lepidoptera for the KEC Site.

For the nighttime surveys, the equipment was set up at the two open fields associated with the KEC Site. During the first two surveys (on July 1st and July 18th), collection took place in the roughly 1.3-acre field within the northern section of the Switchyard Site. On July 26th, 2016, collection took place in the small field (i.e., +/- 0.5 acre) within the Generating Facility Site immediately to the east of the existing residence.

4.0 Target Species

The following are the targeted species listed in a letter[1] from the DEEP NDDB for the KEC Site:

cronicta fragilis	Fragile Dagger Moth	Special Concern
Derrima stellata	Pink Star Moth	Special Concern
Callophrys irus	Frosted Elfin	Threatened

The three listed species were reviewed from images available online. I am familiar with the major Macrolepidoptera taxa and can recognize the listed species. I have participated in Invertebrate Surveys in both Connecticut and Massachusetts and previously worked in the Laboratory of Dr. David Wagner at the University of Connecticut assisting with studies of Lepidoptera.

5.0 Target Species Found

None of the target species were found during invertebrate surveys of the KEC Site.

Callophrys irus (Frosted Elfin) – No individuals of this species were observed during the appropriate flight time in early June. Wagner et al. (2011) mapped vegetation along the NU powerlines both north and south of Lake Road as part of their survey of rare insect habitats. The host plant of the Frosted Elfin (Wild Indigo; *aptisia tinctoria)* was specifically mapped. No population of *aptisia* was noted within or in close proximity to the study area. The closest population was located approximately 0.5 kilometers to the south of the study site along the powerline easement. Based on both observations and the lack of host plant, I've determined with a strong level of certainty that the presence of *Callophrys irus* does not occur on this site.

cronicta fragilis (Fragile Dagger Moth) – No individuals were observed during the survey.

Derrima stellata (Pink Star Moth) – No individuals were observed during the survey.

[1] The letter from Dawn McKay of the DEEP was addressed to George T. Logan of REMA, and is dated March 8th, 2016.

6.0 General Observations

Insects attracted to the lights were predominantly flies (Diptera), caddisflies (Trichoptera) and Lepidoptera. Smaller numbers of Hemiptera, Homoptera, Neuroptera and Coleoptera were observed. At least 80 species of macrolepidoptera were observed from the families Noctuidae, Geometridae, Arctiidae and other groups (see Appendix A). Noctuids represented the most species diverse group of macrolepidoptera observed and were represented by genera including *Catocala* (Underwings), *estia* (Darts), and others. Approximately 110 species of Lepidoptera were observed during the survey, including unidentified macrolepidoptera, microlepidoptera, and butterflies.

As would be expected for open fields adjoining deciduous forest, many of the moth species observed feed as larva on detritus, lichen, mosses, and common plant species found in the survey area including *Plantago*, *itis* and various grasses (e.g. *Poa*). Other species feed on common trees and shrubs found on the KEC Site, such as oak and maple. Many of the moth species observed are generalist feeders with a long list of potential host plants. Some of the moths observed, are host specific or have a narrow range of host plants like *Catocala lineela* and *Catocala amica* which are Oak specialists.

A variety of widespread polyphagous species are present at the KEC Site and have a wide selection of grasses, early successional plants, trees and shrubs to feed on. Some widespread host-specific species of Lepidoptera are also present at the KEC Site and rely on common plant species.

A variety of common butterfly species were observed (Appendix B) primarily in the field sites and edges. The most abundant butterfly species was the Common Ringlet (*Coenonympha tullia* , a grass-feeding species that was found in the fields both north and south of Lake Road. Other species observed included Viceroy, Little Wood Satyr, Black Swallowtail, Least Skipper and Question Mark.

Photographs are provided in Appendix C.

7.0 Other Insect Taxa

The presence of significant numbers of aquatic insects such as caddisflies, aquatic hemipterans, and coleoptera from a diverse assortment of families indicate the proximity of the KEC Site to nearby aquatic and wetland habitats, mostly occurring offsite within the Eversource electric transmission ROW.

.0 Conclusion

Daytime surveys and a lack of the host plant on, or in close proximity to, the KEC Site indicate that *Callophrys irus,* the Frosted Elfin, is not present on the KEC Site in Killingly, Connecticut.

The survey of the KEC Site in Killingly, Connecticut, conducted on three nights in July 2016 yielded no observations of the two target, state-listed moth species (*cronicta fragilis and Derrima stellata).* While this does not preclude their presence, their absence during the survey and the differing habitats at the reported nearby collection sites make this possibility less likely.

9.0 References

1. Wagner DL and Metzler K. Final Report: Insect survey for the Interstate Reliability Project. 18 April 2011. http://www.transmissio-nu.com/residential/projects/IRP/Supplemental%20MCF/Volume%204%20-%20Environmental%20EX%202.PDF
2. Wagner, David. Caterpillars of Eastern North America. Princeton University Press. 2005
3. Beadle D and Seabrooke L. Field Guide to Moths of Northeastern North America. Houghton Mifflin Harcourt. 2012.
4. North American Moth Photographers Group, Mississippi Entomological Museum. Digital Guide to Moth Identification Website. http://mothphotographersgroup.msstate.edu/Plates.shtml Accessed: August 2016
5. Bug Guide. Iowa State University Entomology Department. Website: http://bugguide.net/node/view/15740 Accessed: August 2016.
6. Robinson GS et al. HOSTS – a database of the World's Lepidopteran Hostplants. Natural History Museum, London. Website: http://www.nhm.ac.uk/research-curation/research/projects/hostplants/ Accessed: August 2016.

ATTACHMENT A: LIST OF MOTHS

MOTHS AT THE KEC SITE	
Latin Name	**Common Name**
Drepanidae Hooktip and False Owlet Moths	
Drepana arcuata	Arched Hooktip
Saturniidae Wild Silk Moths	
Anisota stigma	Spiny oakworm moth
Dryocampa rubicunda	Rosy maple moth
Sphingidae Sphinx Moths, Hawkmoths	
Smerinthus jamaicensis	Twin-spotted sphinx
Notodontidae Prominents	
Cerura scitiscripta	Black-Etched Prominent
Noctuidae Owlet Moths, Miller Moths	
Ponometia erastrioides	Small Bird-dropping Moth
Amolita fessa	Feeble Grass Moth
Amphipoea americana	American Ear Moth
Chytonix palliatricula	Cloaked Marvel
Pseudeustrotia carneola	Pink-barred Pseudeustrotia
Leucania sp.	Noctuid moth
Anicla forbesi	Noctuid moth
Apamea amputatrix	Yellow-headed Cutworm Moth
Xestia badicollis	Noctuid moth
Erebidae Erebid Moths	
Subfamily: Arctiinae (Tiger and Lichen Moths)	
Apantesis nais	Nais Tiger Moth
Hypoprepia fucosa	Painted Lichen Moth
Lophocampa caryae	Hickory Tussock Moth or Hickory Tiger Moth
Phragmatobia assimilans	Large Ruby Tiger Moth
Subfamily: Herminiinae (Litter Moths)	
Idia aemula	Common Idia Moth
Macrochilo absorptalis	Slant-line Owlet Moth
Phalaenostola larentioides	Black-banded Owlet Moth
Subfamily: Hypeninae (Hypenines)	
Hypena baltimoralis	Baltimore Bomolocha Moth

MOTHS AT THE KEC SITE	
Latin Name	**Common Name**
Subfamily: Erebinae (Erebine Moths)	
Caenurgina crassiuscula	Clover Looper Moth
Catocala amica	Girlfriend Underwing
Catocala lineella	Girlfriend Underwing
Catocala serena	Serene Underwing
Zale horrida	Horrid Zale
Subfamily: Lymantriinae (Tussock Moths)	
Lymantria dispar	Gypsy Moth
Gracillariidae Leaf Blotch Miner Moths	
Phyllocnistis populiella	Noctuid moth
Tortricidae Tortricid Moths	
Ecdytolopha insiticiana	Locust Twig Borer Moth
Archips purpurana	Noctuid moth
Cenopis pettitana	Maple-basswood Leafroller Moth
Sparganothis unifasciana	Noctuid moth
Limacodidae Limacodids, Slug Caterpillar Moths	
Lithacodes fasciola	Yellow-shouldered Slug Moth
Tortricidia flexuosa	Noctuid moth
Crambidae Crambid Snout Moths	
Elophila obliteralis	Waterlily Leafcutter Moth
Chrysoteuchia topiaria	Noctuid moth
Crambus saltuellus	Noctuid moth
Urola nivalis	Noctuid moth
Desmia funeralis	Grape Leaffolder Moth
Herpetogramma pertextalis	Noctuid moth
Herpetogramma thestealis	Noctuid moth
Parapoynx maculalis	Polymorphic Pondweed Moth
Xanthophysa psychialis	Xanthophysa Moth
Pyralidae Pyralid Moths	
Eulogia ochrifrontella	Noctuid moth
Dolichomia intermedialis	Red-shawled Moth
Hypsopygia costalis	Clover Hayworm Moth

MOTHS AT THE KEC SITE	
Latin Name	**Common Name**
Geometridae Geometer Moths, Looper Moths	
Eugonobapta nivosaria	Snowy Geometer
Eusarca confusaria	Confused Eusarca
Nematocampa resistaria	Horned Spanworm Moth
Plagodis phlogosaria	Straight-lined Plagodis
Prochoerodes lineola	Large Maple Spanworm Moth
Speranza pustularia	Lesser Maple Spanworm Moth
Macaria notate	Birch Angle
Epirrhoe alternata W Carpet	White-banded Toothed Carpet
Eulithis diversilineata	Lesser Grapevine Looper Moth
Eulithis gracilineata	Greater Grapevine Looper Moth
Heliomata cycladata	Common Spring Moth
Scopula limboundata	Large Lace-border
Lasiocampidae Lasiocampid Moths	
Malacosoma americanum	Eastern Tent Caterpillar Moth

ATTACHMENT B: LIST OF BUTTERFLIES

BUTTERFLIES AT THE KEC SITE	
Latin Name	**Common Name**
Hesperiidae Skippers	
Ancyloxypha numitor	Least Skipper
Poanes massasoit	Mulberry Wing
Papilionidae Parnassians and Swallowtails	
Papilio polyxenes	Black Swallowtail
Papilio glaucus	Eastern Tiger Swallowtail
Pieridae Whites and Sulphurs	
Pieris rapae	Cabbage White
Colias philodice	Clouded Sulphur
Lycaenidae Gossamer-wing Butterflies	
Strymon melinus	Gray Hairstreak
Nymphalidae Brush-footed Butterflies	
Speyeria cybele	Great Spangled Fritillary
Limenitis archippus	Viceroy
Phyciodes tharos	Pearl Crescent
Polygonia interrogationis	Question Mark
Satyrodes appalachia	Appalachian Brown
Coenonympha tullia	Common Ringlet
Megisto cymela	Little Wood-Satyr
Cercyonis pegala	Common Wood-Nymph
Junonia coenia	Common Buckeye

ATTACHMENT C: PHOTOS

Lepidopteran Survey at the Killingly Energy Center, Lake Road, Killingly, CT
Photos taken by Jonathan Trouern-Trend, July 2016

A: Mercury Vapor lamp employed at the KEC Site to attract night-flying moths

B: Close up of moths and other invertebrates attracted to mercury vapor lamp

Lepidopteran Survey at the Killingly Energy Center, Lake Road, Killingly, CT
Photos taken by Jonathan Trouern-Trend, July 2016

C: Field-pinned moths from the KEC Site, Lake Road, Killingly, CT

APPENDI F-3 – BAT MONITORING S RVEY RES LTS

August 12, 2016

Susi von Oettingen
USFWS New England Field Office
70 Commercial Street, Suite 30
Concord, NH 03301

Project	NTE Connecticut, LLC Killingly Energy Center Northern Long-eared Bat (NLEB) Presence/Absence Survey
Town	Killingly, Connecticut
Surveyor Name/Firm	Clinton Parrish/Tetra Tech, Inc.
Detector Operation Dates	June 2-9, 2016
Survey Results	**NLEB NOT DETECTED**

Dear Ms. Von Oettingen:

This report contains the results of the northern long-eared bat (*y i ep en ri nali* , hereafter NLEB) summer presence/absence survey for the Killingly Energy Center (the Project) in Killingly, CT. Acoustic detectors deployed by Tetra Tech did not detect NLEB. Two recorded bat calls (bat passes) were identified as NLEB by the auto-classification software, but were found to be misclassified during qualitative review. Additional calls auto-classified as Myotis species were reviewed and no NLEB bat passes were identified.

All nine species of bat found in Connecticut are of conservation concern, per the Connecticut Department of Energy and Environmental Protection (CTDEEP), and eight are classified as "listed species" (i.e., threatened, endangered or special concern) (CTDEEP 2015). The presence of five species was confirmed: eastern red bat (*a i r reali*); big brown bat (*p e i f*); hoary bat (*a i r ineri*); silver-haired bat (*a i ny eri n i a an*); and little brown bat (*y i l if*).

As a precautionary conservation measure, tree clearing for the Project will be restricted in accordance with the requirements of Section 4(d) of the Endangered Species Act, and will not occur in the months of June or July, in order to avoid the pup season for the bats. Significant wooded areas will remain on the site and in the vicinity, with expansion of edge effect habitat providing for additional foraging lanes for bat species.

PRO ECT DESCRIPTION

The purposes of the survey were to provide information on federally threatened or endangered species that have the potential to occur at the Project site, and to supplement natural resource surveys for this area. The 73-acre Project site is located off of Lake Road in Killingly, CT (Figure 1). The proposed Project will consist of an electric generating facility (on the Generating Facility Site), that will require approximately 23.5 acres of tree clearing in the portion of the site closest to Lake Road. In addition, an electrical interconnection switchyard will be located on the Switchyard Site; less than 1.5 acres of clearing will be required on that parcel.

METHODS

The summer presence/absence survey was conducted in accordance with the U.S. Fish and Wildlife Service (USFWS) *2016 Ran e- i e In iana a er r ey i eline – pril 2016* (*In iana a an r hern n -eare a i eline* ; Guidelines). This survey plan utilized a two-phased approach:

Tetra Tech, Inc.
451 Presumpscot Street, Portland, Maine 04103
Tel 207.879.9496 Fax 207.879.9481 www.tetratech.com

Phase 1, desktop and field-based habitat assessments, and Phase 2, acoustic surveys. Acoustic detectors were deployed during field assessments and resulting data were processed using Kaleidoscope Pro v 3.1.5. Qualified Tetra Tech personnel carried out all phases of the survey and specific roles are summarized in Table 1; resumes for relevant staff are provided in (Appendix A).

Table 1. Personnel involved in NLEB Acoustic Presence/Absence Surveys and analyses for illingly Energy Facility, une 2016.

Personnel	Desktop Analysis	Field Assessment	Detector Deployment	Acoustic Analysis	ualitative Analysis
Derek Hengstenberg *il life i l i*	X				
Clinton Parrish *il life i l i*		X	X	X	X
Katelin Craven *il life i l i*					X

Desktop Analysis

Prior to conducting field work, a desktop land cover analysis was performed to identify suitable NLEB habitat (Figure 1). Specifically, aerial photography and Google Earth images were reviewed to determine areas that may be used by NLEB for foraging and roosting during the breeding and migration seasons. Determinations were based on forest patch size, proximity to closed-canopy forests, and landscape features that may be used by bats commuting between roosting and foraging habitats (e.g., forested tracts, wetlands, streams). All open water, wetlands, and relatively contiguous forested lands not highly fragmented by residential or commercial developments were considered suitable NLEB habitat, and all densely populated or developed stretches were determined to be unsuitable. The level of effort was determined based on the assumption that suitable habitat within the facility is non-linear.

Suitable areas included: forested edge surrounding the powerline corridor; and all other forested or wetland areas and associated canopy gaps.

On June 2, 2016, Tetra Tech personnel conducted a site visit to verify the presence of NLEB habitat identified during the desktop analysis and to deploy the acoustic full spectrum detectors. Detectors were deployed for the nights of June 2 through June 9. General habitat descriptions are provided below in Table 2. The completed Phase 1 Summer Habitat Assessment forms are included in Appendix B, and photographs of detectors and habitats are in Appendix C.

Table 2. Station descriptions and survey data at illingly Energy Center, une 2016.

Station	Suitable NLEB Habitat	Description	GPS Coordinates	Survey Dates	Survey Hours
1	Y	Closed canopy flight path between rocky ridge and red maple wetland.	Latitude: 41°51'55.11"N Longitude: 71°55'3.22"W	Acoustic survey was conducted during eight nights (June 2 through June 9 2016)	Detector set to begin recording 1 hour prior to sunset (19:21) to 1 hour following sunrise (06:10)
2	Y	Mature, mixed forests dominated by white pine. Adjacent to a slight oak ridge with open mid and understory.	Latitude: 41°51'43.52"N Longitude: 71°55'1.22"W		

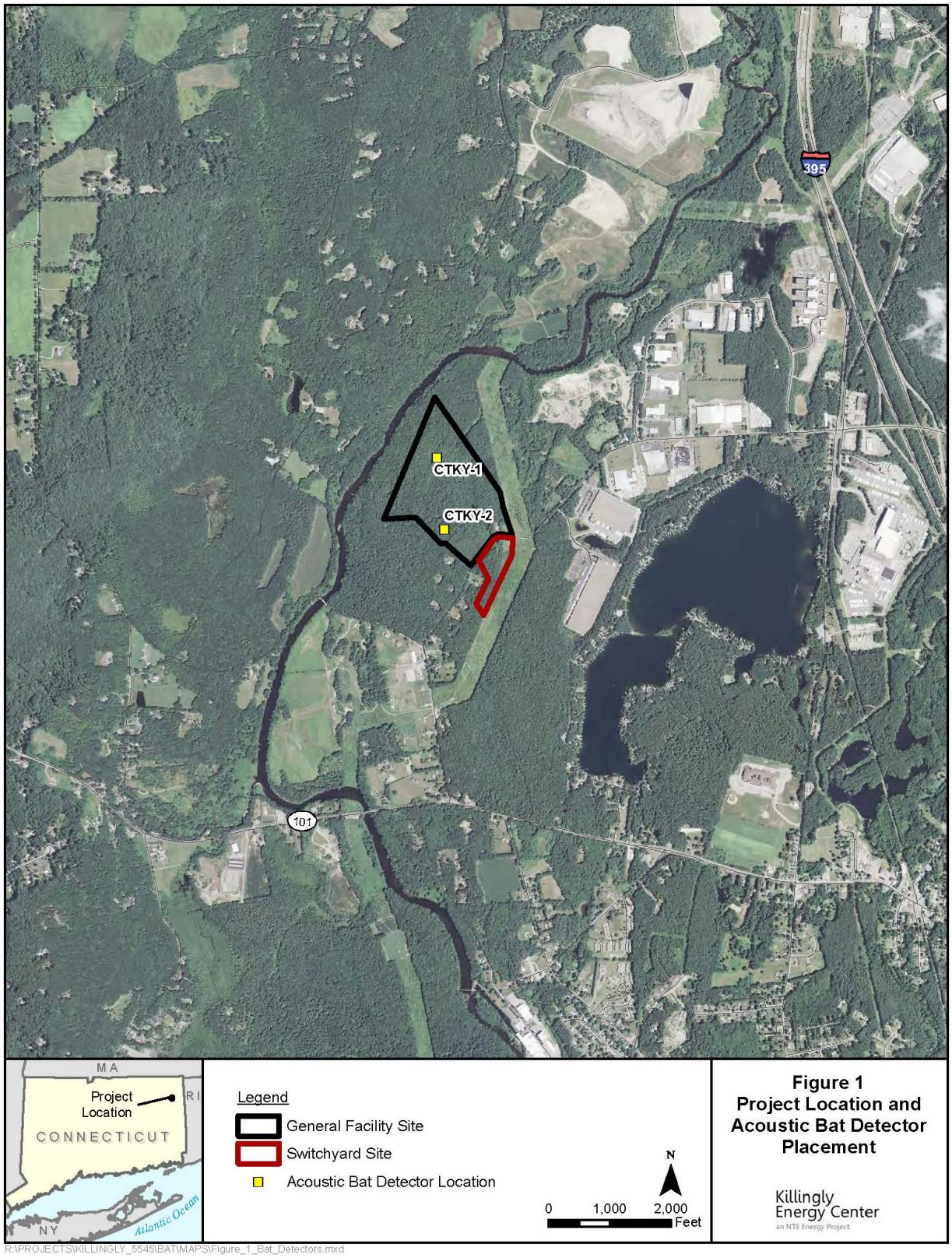


Figure 1. Locations of acoustic detectors deployed at illingly Energy Center on une 2–9, 2016. Field Assessment

Detector Type

Wildlife Acoustics Song Meter-3 BAT (SM-3) ultrasonic bat detector/recorders (Wildlife Acoustics, Inc., Massachusetts, USA) equipped with SMM-U1 omnidirectional microphones were used for the duration of the survey effort. Detectors were set to record from one hour prior to sunset to one hour following sunrise in full-spectrum mode and files were saved in .wav format on internal SD cards. Detectors and accessories are fully waterproof and were powered by internal D cell batteries. Each detector and microphone was tested prior to deployment with a Wildlife Acoustics Ultrasonic Calibrator to ensure equipment was functioning properly and sensitivities were within thresholds. Once detectors were set, a "snap test" was used to ensure all connections were sound and microphones were registering high frequency noise. Log files were reviewed when units were pulled to verify proper functioning for the duration of the survey.

Detector Deployment

Two detectors were micro-sited within the facility in the nearly contiguous forest. Station one was established within a closed canopy (80 percent canopy cover) flight path between a rocky ridge and red maple wetland. The flight path led to an excellent flyway or canopy gap just outside the Project area. The forest dominant species were red oak, birch, white pine, hemlock, and hickory with a diverse size composition. A second detector was deployed in a mature, mixed forest adjacent to a slight oak ridge with open mid and understory to ensure that a variety of potential habitats were sampled in accordance with the USFWS Guidelines. The forest consisted mainly of white pine, red oak, and red maple. Cavities were observed in snags immediately adjacent to the detector. The nearest perennial water source is the Quinebaug River 250 m away from Station 1 and 350 m from Station 2. Where possible, detectors were deployed in the following habitat types in order of descending priority (i.e., detector deployment in openings within interior forests will be prioritized, then within interior closed canopy forests, etc.):

- Interior forest-canopy openings.
- Closed canopy forests.
- Near water sources adjacent to forested habitat.
- Forest edges.
- Linear forested corridors, including corridors connecting forested habitat blocks.

Microphones were mounted on stakes and fastened to metal posts at a height of 2.5 meters (8 feet) to avoid ground vegetation and to elevate the cone of detection. Microphones were oriented in line with suspected flight paths to increase the number of call pulses and quality of recordings (i.e., specific orientation was determined by microsite conditions). Appendix C includes site conditions and photographs depicting detector orientation.

Following is a summary of the acoustic summer presence/absence survey effort:

- The total suitable habitat was determined to be 70 acres.
- Two detectors were deployed from June 2–9, for a total of 16 detector-nights.

ANALYSIS

Tetra Tech analyzed the recorded data according to the USFWS Guidelines. Full spectrum .wav files were first converted to zero-crossing (ZC) using a division ratio of 8. Data was then scrubbed and analyzed using Kaleidoscope Pro (Wildlife Acoustics, Inc.) version 3.1.5 using the classifier "Bats of North America 3.1.0" at a sensitivity level of "-1 more sensitive/liberal." The region selected was the state of Connecticut. Signals of interest ranged from 8–120 kHz lasting 2–500 ms with a minimum of 2 call pulses. All files auto-classified as *y i* species were subsequently manually reviewed using SonoBat v 4.0.6. Results were summarized by site and night.

RES LTS

Weather conditions during the survey period meet requirements outlined in the Guidelines for 6 out of the 8 nights. Summary of weather conditions are available in Table 3 and more details are provided in Appendix

D (Weather Underground 2016). Rain occurred on June 5, accumulating 0.62 inches from 8:30 to 10 pm and on June 7 0.04 inches accumulated between 9 and 10 pm. Nights with rain for over 30 minutes during the first five hours of the survey do not count towards the minimum of 4 detector nights required for a presence absence survey, which leaves 12 detector nights.

On the nights of June 2 through June 9, 496 bat passes were recorded at the two stations (Table 4). Two bat passes were auto-classified as NLEB, but were determined through manual vetting to not possess the call qualities of NLEB. Both were determined to be Low Frequency calls. A total of 39 additional calls auto-classified as little brown bat and Indiana bat were manually reviewed for false negative NLEB calls and to confirm the presence of little brown bat and Indiana bat. Of the 39 recordings, only two bat passes were confirmed as little brown bat (Figure 2), the remainder were determined to belong to eastern red bat (n=23), big brown bat (n=1), or identified as high frequency (n=13) due to lack of call pulses and detail. One of the calls identified as a little brown bat was originally auto-classified as Indiana bat, however the Project area is 50 miles outside of Indiana bat range. Because little brown bat and Indiana bat passes are indistinguishable through manual vetting it is not possible to determine it is not an Indiana bat, but it is unlikely to be an Indiana bat due to the location. Note also the number of calls does not necessarily correlate to numbers of bats present, as individuals frequently pass a number of times through a given area.

Table 3. Summary of Site Conditions on the nights of une 2 through une 9, 2016 at illingly Energy Center, CT.

Date	Temp Night High	Temp Night Low	Wind Speed	Precipitation	Notes
6/2/2016	75	61	calm to 8 mph	0.00in	
6/3/2016	63	61	mostly calm up to 8 mph	0.00in	
6/4/2016	69	64	5 mph	0.00in	
6/5/2016	68	65	3.6-10 mph	0.62in	8:30-10:00pm rain
6/6/2016	81	63	calm to 9 mph	0.00in	
6/7/2016	75	57	3.5 to 15 mph	0.04in	9pm rain
6/8/2016	65	55	7-17 mph	0.00in	
6/9/2016	63	53	3.5-10 mph	0.00in	

Table 4. Summary of bat passes on the nights of une 2 through une 9, 2016 at illingly Energy Center, CT.

Site	Date	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Small-footed Bat	Little Brown Bat	NLEB	Indiana Bat	Tri-colored Bat	HiFq	LoFq	Grand Total
CT Y-1	6/2/2016	1		1									2
	6/3/2016	5			4								9
	6/4/2016	12			1								13
	6/5/2016	2		1									3
	6/6/2016	3											3
	6/7/2016	10		7	5								22
	6/8/2016	27										2	29
	6/9/2016	1		1	1								3
	Total	**61**		**10**	**11**							**2**	**84**
CT Y-2	6/2/2016	39	11	1	16						3		70
	6/3/2016	69	9	11	13						3		105
	6/4/2016	4		10	9								23
	6/5/2016			2	2								4
	6/6/2016	29		3	4								36
	6/7/2016	94	15	2	14		2				1		128
	6/8/2016	26									3		29
	6/9/2016	7	2	5							3		17
	Total	**268**	**37**	**34**	**58**		**2**				**13**		**412**
Grand Total		**329**	**37**	**44**	**69**		**2**				**12**	**2**	**496**

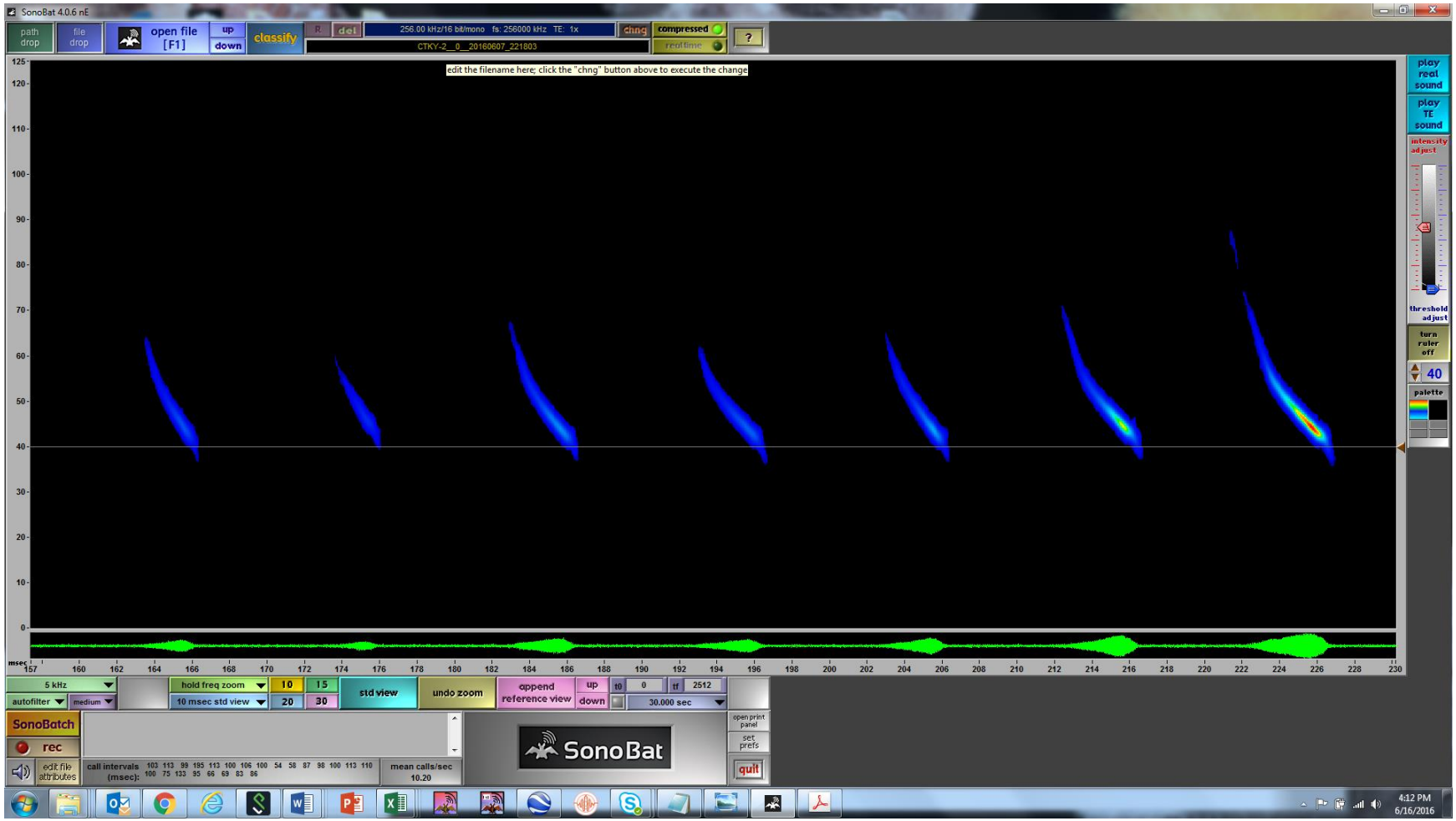


Figure 2. Screenshot of little brown bat call detected at Station 2 on the night of une 7, 2016 at illingly Energy Center.

Maximum Likelihood Estimates (MLEs) suggested species presence for big brown bat, eastern red bat, hoary bat, little brown bat, and Indiana bat (Table 5). Given that 69 bat passes were auto-classified as silver-haired bat, it is likely that that this species is also present at the Project site, but there was not sufficient statistical evidence of presence or the classification error for this species was not a good fit for this particular dataset. Indiana bats are likely not present in the area due to the Project location being 50 miles outside of Indiana bat range.

Table 5. Summary of Maximum Likelihood Estimates (MLEs) for species presence by aleidoscope Pro on the nights of une 2 through une 9 at illingly Energy Center.

Site	Date	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Small-footed Bat	Little Brown Bat	NLEB	Indiana Bat	Tri-colored Bat
CT Y-1	2-Jun	0.22	1.00	**0.05**	1.00	1.00	1.00	1.00	1.00	1.00
	3-Jun	**0.01**	1.00	1.00	0.16	1.00	1.00	1.00	1.00	1.00
	4-Jun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	5-Jun	**0.04**	1.00	0.09	1.00	1.00	1.00	1.00	1.00	1.00
	6-Jun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	7-Jun	**0.005**	1.00	**0.00**	0.84	1.00	1.00	1.00	1.00	1.00
	8-Jun	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	9-Jun	0.49	1.00	0.06	0.81	1.00	1.00	1.00	1.00	1.00
CT Y-2	2-Jun	**0.00**	**0.01**	0.88	0.09	1.00	**0.005**	1.00	0.72	1.00
	3-Jun	**0.00**	0.12	**0.005**	1.00	1.00	**0.005**	1.00	**0.03**	1.00
	4-Jun	0.34	1.00	**0.00**	0.07	1.00	1.00	1.00	1.00	1.00
	5-Jun	1.00	1.00	**0.005**	0.47	1.00	1.00	1.00	1.00	1.00
	6-Jun	**0.00**	1.00	**0.03**	1.00	1.00	1.00	1.00	1.00	1.00
	7-Jun	**0.00**	**0.02**	0.83	1.00	1.00	**0.00**	1.00	0.33	1.00
	8-Jun	**0.00**	1.00	1.00	1.00	1.00	**0.005**	1.00	1.00	1.00
	9-Jun	**0.005**	0.61	**0.005**	1.00	1.00	**0.005**	1.00	1.00	1.00

Note: Maximum Likelihood Estimates (MLEs) interpretation – values <0.05 indicates there is 95% confidence that the species is present. **Bold** values indicate significance.

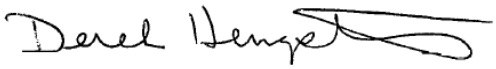
CONCL SION

The federally listed threatened NLEB was not detected at the Project site. However, five bat species were identified, among them four of the eight state-listed bats – the eastern red bat, hoary bat, silver-haired bat, and little brown bat – were detected during the survey (June 2–9, 2016) (USFWS 2016b). The four species not detected during the survey (Indiana bat, NLEB, tri-colored bat, small footed bat) are federally or state-listed (i.e., endangered or special concern).

As a precautionary conservation measure, tree clearing for the Project will be restricted in accordance with 4(d) requirements, and will not occur in the months of June or July, in order to avoid the pup season for the bat species. Significant wooded areas will remain on the site and in the vicinity, with expansion of edge effect habitat providing for additional foraging lanes for bats. The area will continue to provide habitat suitable for bat use during the summer activity period, given that substantial forested area will remain, additional edge habitat will be created, and other nearby forested areas are located in proximity.

Please be in touch if you have any questions about this report: derek.hengstenberg@tetratech.com or 207-358-2401.

Very truly yours,



Derek Hengstenberg
Certified Wildlife Biologist/ Project Manager

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APPENDI A
RELEVANT STAFF RES MES

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Experience Summary

Mr. Parrish has more than seven years of experience conducting wildlife and habitat projects in the Northeast, California, and Idaho. His responsibilities have been distributed over a wide variety of terrestrial and aquatic projects with a particular emphasis on avian ecology, avian response to wind development, avian and bat acoustic monitoring, physical and biological stream surveys, habitat assessment and management, and carnivore monitoring. Most recently, Mr. Parrish lead a multiyear investigation in northern New Hampshire on the impacts of wind development on high-elevation avian species with a focus on Bicknell's Thrush, a federal species of concern. Mr. Parrish is an experienced field biologist who has served as project lead as a consultant for New Hampshire Department of Fish and Game and as an employee for state and federal agencies. Mr. Parrish is proficient with data management and analysis using MS Access, GIS, and the program R.

Education

MS, Biology, Plymouth State University, 2013
BS, Environmental Biology, Magna Cum Laude, Plymouth State University, 2003

Registrations/Certifications

Geographic Information Systems; University of Idaho; 2012

Training

Aquatic Invasive Species Detection and Prevention; 2010
National Environmental and Policy Act (NEPA); 2010
CPR/ First Aid; 2015

Corporation Project Experience

Wildlife Biologist, July 2014–Present
US Navy, Shorebird Monitoring, Naval Station Cutler, ME

Mr. Parrish is conducting bi-monthly shorebird surveys in accordance with International Shorebird Survey (ISS) protocol. Several habitats adjacent to the project area have been identified as Important Bird Areas (IBAs) by Maine Audubon for contributions as critical migration stop-over habitats and warrant standardized long-term monitoring to contribute to migratory bird population data.

Data Analyst and Reviewer, January 2013–Present
U.S. Fish and Wildlife Service (USFWS), Acoustic Bat Monitoring, East Coast

Mr. Parrish was one of two Tetra Tech employees responsible for managing, processing, and reviewing acoustic bat recordings for up to 32 National Wildlife Refuges (NWR) on the east coast from 2012 and 2013. File formats and level of organization varied depending on refuge, and was arranged in standardized directories prior to processing using either full spectrum (Sonobat) or zero cross (BCID) classification software. Automated classifications were then summarized and qualitatively vetted (i.e., manually reviewed on a spectrogram) to determine accuracy of automated classification. Mr. Parrish will be processing acoustic data for 8 NWRs and qualitatively reviewing data for a total of 32 NWRs in 2015.

Wildlife Biologist, March 2015–Present
NAVFAC, Acoustic Bat Monitoring, VA and NJ

Mr. Parrish deployed a total of 16 acoustic bat detectors at three naval stations in the Norfolk, VA area and on one installation in NJ. Detector set ups will operate through the fall to collect information on species composition, and activity levels across and entire warm season. Mr. Parrish is responsible for managing all incoming acoustic recordings and will be the lead data analyst as well as generating reports on survey results.

The contents of this page are proprietary to Tetra Tech.

Wildlife Biologist, April 2015–Present
Nextera Energy, Acoustic Bat Monitoring, ND
As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in North Dakota. Mr. Parrish deployed five ground based acoustic detectors to determine the presence/absence of the Federally Threatened northern long-eared bat. In addition, acoustic data was used to determine the species composition and level of temporal activity of bats during the entire warm season in 2015.

Wildlife Biologist, March 2014–February 2015
Eoilan Renewable Energy, Eagle use and nest surveys, ME
Mr. Parrish carried out independent, bi-monthly eagle and raptor surveys for a potential small scale wind project in Downeast Maine. In addition to use surveys, Mr. Parrish conducted spring bald eagle nest surveys as a passenger in a small, fixed-wing aircraft in the greater project area to determine the number of resident eagles and assess potential risk of a wind facility.

Wildlife Biologist, August 2014–February 2015
Massachusetts Army National Guard (Camp Edwards), Acoustic Bat Monitoring, MA
Due to the proposed listing of northern long-eared bat as endangered under the Endangered Species Act (ESA) by the United States Fish and Wildlife Service (USFWS) and the documented declines of bats from white-nosed syndrome, there is growing concern regarding negative impacts on this increasingly vulnerable species. Mr. Parrish was part of a project to collect information on the species richness, activity levels, and spatio-temporal use patterns of bats (Microchiroptera) during the late-summer and fall period. Passive acoustic bat monitors were used to record calls which were then analyzed by Mr. Parrish using two software programs. Mr. Parrish then conducted statistical analysis examining spatial and temporal relationships and presented results in a final report.

Wildlife Biologist, August 2014–February 2015
Nextera Energy, Acoustic Bat Monitoring, SD
As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in South Dakota. The objective of this project was to determine the presence or absence of the Federally Threatened Northern Long-eared bat and Mr. Parrish deployed acoustic monitors throughout project area within suitable habitats and preformed a habitat assessment for potential occurrence of bat species using 2013 USFWS Indiana Bat survey guidelines. Prepared reports on habitat suitability for bat species within project area, analyzed all acoustic data, and presented results in a report of the results from acoustic monitoring during the fall migration period in 2014.

Wildlife Biologist, April 2014–February 2015
Nextera Energy, Acoustic Bat Monitoring, ND
As a wildlife biologist, Mr. Parrish conducted a pre-construction bat acoustic survey at a proposed large-scale wind power project in North Dakota. Mr. Parrish deployed three ground based acoustic detectors and two detectors in meteorological towers to determine the species composition and level of temporal activity of bats during the entire warm season in 2014. Mr. Parrish used two software programs to analyze acoustic data and then summarized results for reporting.

Wildlife Biologist, November–January 2015
BH2M Civil Engineering, New England Cottontail survey, ME
To determine the presence or absence of the New England Cottontail (a candidate species to be included on the Federal ESA and Endangered Species in Maine), Mr. Parrish is conducted a remote camera survey in plot adjacent to a suburban area in Maine.

Experience Summary

Mr. Hengstenberg is a Certified Wildlife Biologist with 18 years of experience in wildlife biology, wind energy ecology, natural resource assessment, aero-ecology studies, tropical field studies, and project management. Mr. Hengstenberg has extensive knowledge of wildlife studies and is well versed in scientific techniques and equipment including bat acoustic surveys, raptor migration studies, breeding bird surveys, avian radar ornithology, threatened & endangered species surveys, seabird & shorebird surveys, grassland bird surveys, tropical flora and fauna, and mist-netting of birds and bats. Mr. Hengstenberg has worked on natural resources projects across the country and throughout Latin America.

Mr. Hengstenberg has extensive range of field experience throughout New England, the Mid-Atlantic, the Northwest, the Southwest, Puerto Rico, and Mexico. Mr. Hengstenberg is a proficient technical writer and has extensive knowledge of various word processing, presentation, and statistical analysis applications. Mr. Hengstenberg is also experienced with endangered species and has worked closely with both state and federal agencies during the permitting process of wind energy and natural resource projects.

Education

MS, Wildlife & Fisheries Science, Mississippi State University, 2003
BS, Interdisciplinary Studies/Wilderness Research Administration, Plymouth State University, 1998

Registrations/Certifications

Certified Wildlife Biologist- The Wildlife Society; 2011

Training

Bat Acoustic Data Management; 2015
CPR and First Aid Certification; 2015
Airport Wildlife Hazard Management Workshop; 2010
OSHA HAZWOPER Certification and Refresher; 2008
Basic and Advanced Erosion & Sediment Control Course; 2008
Red Card Certification (Wildland Firefighter); 1997

Corporation Project Experience

Lead Project Biologist- July 2014 to Present
Northern Long-Eared Bat Surveys at multiple United States Department of the Navy Installations – Naval Facilities Engineering Command, Mid-Atlantic

Managing and providing field support for completion of presence/absence surveys for northern long-eared bat (*Myotis septentrionalis*) at multiple Naval installations located along the east coast of the United States. Field surveys include bat acoustic and mist netting surveys in accordance with federal protocols established by the United States Fish and Wildlife Service (USFWS) and detailed in USFWS' 2015 Northern Long-Eared Bat Interim Conference and Planning Guidance and USFWS' 2015 Range-Wide Indiana Bat Summer Survey Guidelines. Information collected will be used by natural resources managers to make informed decisions at the eight Installations where these surveys are being conducted to avoid negative impacts to this vulnerable species from Naval activities. Tetra Tech has teamed with Biodiversity Research Institute to complete the field work and data analysis.

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Lead Project Biologist – May 2015 – Present
State of Maine Department of Transportation (MaineDOT), Two Stand-Alone State-Wide Multi-PIN Project Contracts: Natural Resources and Underwater Sound Monitoring, Maine
Wildlife biologist for Endangered Species Act (ESA) Biological Assessments, consultation, and conferencing support for northern long-eared bat and bat habitat assessment and presence/absence acoustic monitoring. Recent listing of northern long-eared bat has increased the focus on evaluating potential impacts of MaineDOT projects on the species through habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: the Northern Long-Eared Bat Interim Conference and Planning Guidance: USFWS Regions 2, 3, 4, 5 & 6 (NLEB Guidance) and the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (Indiana Bat Guidelines).

Lead Project Biologist, May 2015 – Present
Northern Long-Eared Bat Support Services for the State of Massachusetts Department of Transportation (MassDOT), Massachusetts
Wildlife biologist for all northern long-eared bat support services for MassDOT, performing a variety of tasks related to the understanding the potential impacts to the species following its listing under the ESA. Projects are expected to include habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: NLEB Guidance and the Indiana Bat Guidelines.

Lead Project Biologist- January 2009 to Present
Spruce Mountain Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction and post-construction survey including a bird and bat mortality surveys, avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos. Provided the client advice on erosion and sediment control measures at the newly constructed site so that they comply with permit conditions.

Lead Project Biologist- January 2009 to Present
Saddleback Ridge Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans, bird and bat conservation strategy plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

Lead Project Biologist- January 2010 to 2012
Canton Mountain Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, eagle aerial survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

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Experience Summary

Ms. Craven has over four years of experience as a wildlife biologist conducting natural resource projects in Colorado, Wyoming, and the Northeast. She has a broad background in environmental science and wildlife biology. Her responsibilities have been distributed over a wide variety of wildlife species including endangered and invasive species. She has particular emphasis in mammals and more specifically in bat biology. She has extensive knowledge of bat acoustic monitoring, data management, and data analysis. Ms. Craven has been involved with acoustic bat monitoring projects throughout the country and is an experienced field biologist having played a lead role in organizing and conducting the NABat Program for the state of Maine, an acoustic bat monitoring program across the state. Most recently she has provided data analysis, according to U.S. Fish and Wildlife Service policy and protocols, for Navy facilities across the Northeast and commercial energy facilities in the Midwest and incorporated the data into summary reports.

Education

MS, Biology, University of Northern Colorado, 2013
BS, Environmental Science, Colorado College, 2007

Training

Bat Acoustic Data Management Workshop, Bat Conservation and Management, Harrisburg, Pennsylvania
Cultural and Natural Resource Management, Sibley Group, Olympia, Washington
NEPA Process and Endangered Species Act, Sibley Group, Olympia, Washington
Wildland Fire Training S-103/ S-109/L-180, National Wildlife Coordinating Group, Wyoming
40-Hour OSHA Hazardous Waste Health and Safety Training, OSHA, Denver, Colorado
Wilderness First Responder, Colorado Springs, CO
Wilderness First Aid and CPR, Portland, ME

Corporation Project Experience

Wildlife Biologist, United States Navy Facilities, Bat Acoustic Detector Deployment, Data Survey Analysis and Reporting, Various Installations, Eastern U.S.

Deployed Wildlife Acoustic SM3 acoustic detectors and acoustically surveyed Installations according to USFWS 2016 Indiana Bat Summer Survey Analysis Guidelines. Analyzed data for both baseline surveys and presence absence surveys for the federally threatened northern long-eared bat. Analyzed bat calls using Kaleidoscope Pro and manually vetted species of interest and spot checked for accuracy with Sonobat 3.3.2. Summarized mist-netting survey data, emergence counts, and interpreted northern long-eared bat radio-tracking results. Compiled data into summary reports.

Wildlife Biologist, United States Navy Facilities, Bat Mist-netting, Radio Tracking, and Roost Emergence Surveys, Various Installations, Virginia

Mist-netted, radio tracked, and conducted roost emergence counts according to USFWS 2016 Indiana Bat Summer Survey Analysis Guidelines. Experience handling the federally threatened northern long-eared bat and various northeastern bat species.

Wildlife Biologist, United States Fish and Wildlife Service, Wildlife Refuge System, Bat Acoustic Monitoring Analysis, Various refuges, Eastern U.S.

Analyzed bat acoustic data with Sonobat 3.2.2 and manually vetted Myotis spp. calls. Summarized data.

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Wildlife Biologist, United States Navy Facilities, Fatality Surveys, Searcher Efficiency Trials, and Bat Detector Deployment, Cutler, Maine
Conducted fatality survey sweeps of plots preparing for fatality surveys. Conducted three searcher efficiency trials during fatality surveys. Deployed five Wildlife Acoustic SM3 bat acoustic detectors, checked detectors bi-weekly, downloaded and managed data, and repaired any detector system issues.

Wildlife Biologist, NextEra and Capital Power, Bat Detector Deployment, Various Commercial Wind Energy Projects, North Dakota
Deployed Wildlife Acoustics SM3 detectors at three commercial wind energy projects.

Wildlife Biologist, Sempra, Bat Data Analysis and Interim Reports, Broken Bow II, Nebraska
Analyzed bat acoustic data with Kaleidoscope Pro and Manually vetted Myotis spp. calls. Summarized data for report. Determined species from photos of bat fatalities.

Wildlife Biologist, Kinder Morgan, Ecological Assessment of Bats, Birds, and Small Mammals, Bearfort Mountain Natural Area, New Jersey
Analyzed bat calls from four detectors recording from May – Oct using Kaleidoscope Pro and manually vetting species of interest and spot checking for accuracy with Sonobat 3.3.2. Wrote report on findings. Conducted fall small mammal surveys with Sherman traps and edited small mammal report. Co-wrote report on avian surveys including point counts, raptor migration, and nocturnal predator surveys.

Wildlife Biologist, Bat Acoustic Data Analysis, Na Pua Makani Wind Project, Hawaii
Analyzed data using Kaleidoscope Pro and manually vetted unclassified calls in Sonobat 4.0.6 for presence of the federally endangered species, Hawaiian hoary bat. Summarized results and created figures for report.

Wildlife Biologist, Maine Department Of Transportation, Bat Acoustic Data Survey Reporting, Various Projects, Maine
Responded to comments on six bat acoustic data survey reports including creating screen shots of representative MYSE calls for the report in Sonobat 3.3.2. Converted data from full spectrum to zero-crossing.

Wildlife Biologist, NextEra, Northern Long-eared Bat Habitat Assessment Reporting, Crowned Ridge, South Dakota
Wrote report assessing the likelihood of northern long-eared bat presence in the area chosen for a pipeline and the suitability of habitat to be removed for the federally threatened northern long-eared bat and compiled photo-log.

Relevant Previous Experience

Master's Student, University of Northern Colorado, Research and Thesis, Colorado
Designed and implemented research over three field seasons on habitat use by bats in forested, edge, and masticated Ponderosa pine forest in Boulder County, Colorado. Used mist nets to capture bats for determination of species, weight, sex, age, and reproductive status. Used Pettersson D240x for acoustic recording and determined call to species with Sonobat 3.0 and manual vetting. Insect sampling with black light traps and keying to order.

Contracted Wildlife Biologist, Maine Inland Fisheries and Wildlife, NA Bat Program, Maine
Provided planning assistance for NA Bat monitoring program for the state of Maine. Planned road driving transects, assisted volunteers with stationary detector placement, and acquiring land owner permission. Processed, analyzed, and managed incoming data using Kaleidoscope Pro software. Gained experience with both full spectrum and zero crossing detectors including Anabat, EM3+, and SM2+ detectors.

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APPENDI B
COMPLETED PHASE 1 S MMER HABITAT ASSESSMENT FORMS

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NLEB
~~INDIANA~~ BAT HABITAT ASSESSMENT DATASHEET

Project Name: KILLINGLY ENERGY CENTER (KEC) Date: 6/2/2016

Township/Range/Section:

Lat Long/UTM Zone: MT 2557854 4638938 Surveyor: C. PARRISH

CTKY-1

Brief Project Description

AN APPROX. 550-MW electric generating Facility & switchyard to be located ON ~ 72 acres OF LAND OFF OF LAKE ROAD IN THE TOWN OF KILLINGLY, CT

Project Area

	Total Acres	Forest Acres	Open Acres
Project	~72	~70	~2

Proposed Tree Removal (ac) *EXACT AMOUNT UNKNOWN	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
	~50%	NA	NA

Vegetation Cover Types

Pre-Project	Post-Project
FORESTED WETLAND	- FORESTED - WETLAND - COMMERICAL / INDUSTRIAL USE - PARKING AREAS, ROADWAYS

Landscape within 5 mile radius

Flight corridors to other forested areas?

YES, ABUNDANT FORESTED AREAS IN THIS PART OF NORTH EASTERN, CT

Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

FORESTED LAND, QUINEBAUG RIVER (RIPARIAN AREA) POWERLINE CORRIDOR, COMMERIAL DEVELOPMENT NUMEROUS PONDS IN THE AREA, ,

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Mashamoquet BROOK STATE PARK (CT) ~3mi
NATCHAUG STATE FOREST (CT) ~7mi

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): CTKY-1

SITUATED ON CANOPY RIDING POTENTIAL FLIGHT PATH BETWEEN ROCKY RIDGE + RED MAPLE ~~SWAMP~~ WETLAND

Water Resources at Sample Site

	Ephemeral	Intermittent	Perennial
Stream Type (# and length)			X
Pools/Ponds (# and size)	650m 3.5ac	Open and accessible to bats? Y	
Wetlands (approx. ac.)	Permanent	Seasonal	

Describe existing condition of water sources:
- NEAREST PERENNIAL STREAM ~ 250m to NW (QUINEBAUG RIVER)
- BRUCE PONDS (2) ~ 2.5 ac 700m TO WEST
- ALEXANDER LAKE ~ 140 ac 900m TO SE

Forest Resources at Sample Site

	Canopy (> 50')	Midstory (20-50')	Understory (<20')
Closure/Density	5/90%	2/15%	1/5%
Dominant Species of Mature Trees	RED OAK, GRAY BIRCH, WHITE PINE, HEMLOCK, HICKORY		
% Trees w/ Exfoliating Bark	1%		
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	3 40%	3/35%	3/25%
No. of Suitable Snags		1	

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable

IS THE HABITAT SUITABLE FOR ~~INDIANA~~ NLEB BATS? YES

Additional Comments:

NICE, POTENTIAL FLY WAY THAT LEADS TO EXCELLENT FLYWAY/CANOPY GAP JUST OUTSIDE OF PROJECT AREA.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy, examples of potential suitable snags and live trees, water sources

PHOTOS OF ~~SITE~~ STATION, WETLAND, ROCKY RIDGE, SNAG + SHAGBARK HICKORY

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

NLEB ~~INDIANA~~ BAT HABITAT ASSESSMENT DATASHEET

Project Name: KILLINGLY ENERGY CENTER (KEC) Date: 6/10/2016

Township/Range/Section:

Lat Long/UTM Zone: 19T 0257888 4638579 Surveyor: C. PARRISH

Brief Project Description CTKY-2

AN APPROX. 550-MW electric generating facility & switchyard to be located ON ~ 72 acres OF LAND OFF OF LAKE ROAD IN THE TOWN OF KILLINGLY, CT

Project Area

	Total Acres	Forest Acres	Open Acres
Project	~72	~70	~2

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac) *EXACT AMOUNT UNKNOWN	~50%	NA	NA

Vegetation Cover Types

Pre-Project	Post-Project
FORESTED WETLAND	- FORESTED - WETLAND - COMMERICAL / INDUSTRIAL USE - PARKING AREAS, ROADWAYS

Landscape within 5 mile radius

Flight corridors to other forested areas?

YES, ABUNDANT FORESTED AREAS IN THIS PART OF NORTH EASTERN, CT

Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

FORESTED LAND, QUINEBAUG RIVER (RIPARIAN AREA) POWERLINE CORRIDOR, COMMERIAL DEVELOPMENT NUMEROUS PONDS IN THE AREA, 1

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Mashamoquet BROOK STATE PARK (CT) ~3mi
NATCHAUG STATE FOREST (CT) ~7mi

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No (s): CTRY-2

MATURE, MIXED FOREST DOMINATED BY WHITE PINE. ADJACENT TO A SLIGHT OAK RIDGE W/ OPEN MID & UNDERSTORY

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial
			X
Pools/Ponds (# and size) 3		Open and accessible to bats? Y	
Wetlands (approx. ac.) 0.06 AC	Permanent X	Seasonal	

Describe existing condition of water sources
- SMALL POND 3.5 AC TO NE ~600m
- BRUCE PONDS (2) ~2.5 AC 700m to WEST
- QUINEBAUG RIVER ~350m to NW
- ALEXANDER LAKE ~140AC 780m to SE

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')
	6 / 90%	3 / 30%	0%
Dominant Species of Mature Trees	WHITE PINE, RED OAK, RED MAPLE		
% Trees w/ Exfoliating Bark	0%	0%	0%
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	5%	10%	85%
No. of Suitable Snags		2	

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable - 2 SNAGS IMMEDIATELY ADJACENT TO DECIDUOUS HAVE CAVITIES

IS THE HABITAT SUITABLE FOR ~~INDIANA~~ NLEB BATS? YES

Additional Comments: AMPLE FORAGING PATHS W/IN THIS MATURE STAND & HIGH CANOPY (~70')
AVIAN SP. ARE CHARACTERISTIC OF MATURE FOREST (PIWA, EWPE, BVEN, BRCR)
OLD FIELD SITE (STONE WALL, DOMINATED BY PINE)
ADJACENT TO SLIGHT RIDGE; FORAGING SIDEHILL FOR NLEB

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy, examples of potential suitable snags and live trees; water sources

MULTIPLE PHOTOS OF SITE ATTACHED W/ COMMENTS

APPENDI C
SITE CONDITIONS AND DETECTOR ORIENTATION PHOTOGRAPHS

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Photo : CTKY-1_1

Comments: View to the southwest through a potential, within canopy flight path. The west is flanked by a rocky outcropping near the top of a slight ridge. To the east is a stand of mature white pine and hemlock that borders a swamping area dominated by ferns, sphagnum and red maple.

Photo : CTKY-1_2

Comments: View to the north through a potential within canopy flight path. This path leads to a grassy corridor approximately 100 m to the north.

Photo : CTKY-1_3

Comments: View to the west of detector station (right side of frame) and rocky outcropping.

Photo : CTKY-1_4

Comments: Red maple “swamp” approximately 50 m east of station.

Photo : CTKY-2_1

Comments: View to the north of closed canopy, two-track road approximately 70 m west of station on the project area boundary.

Photo : CTKY-2_2

Comments: View to the east towards station. Station is not visible but is located near the center of the frame approximately 70 m from photo location.

Photo : CTKY-2_3

Comments: View to the east of habitat adjacent to station. Mixed, mature forest. Avian species observed at this station are typical found in mature forests (e.g., brown creeper, eastern wood peewee).

Photo : CTKY-2_4

Comments: Station overview. View to the northeast.

Photo : CTKY-2_5
Comments: Potential, within-canopy flight path.

Photo : CTKY-2_6

Comments: Old maple snag with crevices. There were also several mature white pine snags in the vicinity of the station with bark shedding.

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APPENDI D
DETAILED WEATHER CONDITIONS

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Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
6/2/2016	6:52 PM	75.0 °F	55.9 °F	51%	30.09 in	10.0 mi	South	8.1 mph	N/A	Clear
	7:52 PM	70.0 °F	57.0 °F	63%	30.09 in	10.0 mi	South	8.1 mph	N/A	Clear
	8:52 PM	66.0 °F	55.9 °F	70%	30.10 in	10.0 mi	SSE	6.9 mph	N/A	Clear
	9:38 PM	63.0 °F	55.0 °F	75%	30.13 in	10.0 mi	Variable	4.6 mph	N/A	Mostly Cloudy
	9:52 PM	62.1 °F	55.0 °F	78%	30.13 in	10.0 mi	Variable	3.5 mph	N/A	Overcast
	10:52 PM	62.1 °F	54.0 °F	75%	30.13 in	10.0 mi	SSE	5.8 mph	N/A	Overcast
	11:52 PM	62.1 °F	54.0 °F	75%	30.13 in	10.0 mi	SE	3.5 mph	N/A	Overcast
	12:52 AM	61.0 °F	55.0 °F	81%	30.12 in	10.0 mi	SSE	3.5 mph	N/A	Overcast
	1:52 AM	62.1 °F	55.0 °F	78%	30.10 in	10.0 mi	SE	3.5 mph	N/A	Overcast
	2:52 AM	62.1 °F	55.0 °F	78%	30.09 in	10.0 mi	Calm	Calm	N/A	Overcast
	3:52 AM	62.1 °F	55.0 °F	78%	30.08 in	10.0 mi	Calm	Calm	N/A	Overcast
	4:52 AM	62.1 °F	55.0 °F	78%	30.08 in	10.0 mi	South	4.6 mph	N/A	Overcast
	5:52 AM	62.1 °F	55.0 °F	78%	30.08 in	10.0 mi	SSW	3.5 mph	N/A	Overcast
6/3/2016	6:52 PM	70.0 °F	61.0 °F	73%	30.01 in	10.0 mi	South	5.8 mph	N/A	Mostly Cloudy
	7:52 PM	69.1 °F	61.0 °F	75%	30.01 in	10.0 mi	South	4.6 mph	N/A	Mostly Cloudy
	8:48 PM	68.0 °F	60.8 °F	78%	30.02 in	10.0 mi	SW	5.8 mph	N/A	Overcast
	8:52 PM	68.0 °F	61.0 °F	78%	30.02 in	10.0 mi	SW	5.8 mph	N/A	Overcast
	9:20 PM	68.0 °F	61.0 °F	78%	30.03 in	10.0 mi	SSW	5.8 mph	N/A	Overcast
	9:52 PM	68.0 °F	61.0 °F	78%	30.04 in	10.0 mi	SSW	3.5 mph	N/A	Overcast
	10:52 PM	66.9 °F	61.0 °F	81%	30.03 in	10.0 mi	SSW	6.9 mph	N/A	Overcast
	11:48 PM	66.2 °F	60.8 °F	83%	30.03 in	9.0 mi	SW	3.5 mph	N/A	Overcast
	11:52 PM	66.0 °F	61.0 °F	84%	30.03 in	8.0 mi	SW	6.9 mph	N/A	Overcast
	12:52 AM	66.0 °F	61.0 °F	84%	30.03 in	6.0 mi	SW	3.5 mph	N/A	Haze
	1:52 AM	66.0 °F	61.0 °F	84%	30.01 in	5.0 mi	Calm	Calm	N/A	Haze

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
	2:52 AM	66.0 °F	62.1 °F	87%	30.01 in	5.0 mi	Calm	Calm	N/A	Overcast
	3:52 AM	66.0 °F	62.1 °F	87%	30.00 in	4.0 mi	Calm	Calm	N/A	Overcast
	4:39 AM	66.0 °F	62.1 °F	87%	29.99 in	4.0 mi	Calm	Calm	N/A	Mostly Cloudy
	4:48 AM	66.2 °F	62.6 °F	88%	29.99 in	4.0 mi	Calm	Calm	N/A	Scattered Clouds
	4:52 AM	66.0 °F	62.1 °F	87%	29.99 in	4.0 mi	Calm	Calm	N/A	Scattered Clouds
	5:20 AM	64.9 °F	61.0 °F	87%	30.00 in	2.5 mi	Calm	Calm	N/A	Scattered Clouds
	5:23 AM	64.9 °F	61.0 °F	87%	30.00 in	2.5 mi	Calm	Calm	N/A	Mostly Cloudy
	5:38 AM	64.0 °F	61.0 °F	90%	30.00 in	1.8 mi	Calm	Calm	N/A	Mostly Cloudy
	5:47 AM	64.4 °F	60.8 °F	88%	30.00 in	2.0 mi	Calm	Calm	N/A	Overcast
	5:52 AM	64.9 °F	61.0 °F	87%	30.00 in	2.0 mi	Calm	Calm	N/A	Overcast
	6:04 AM	66.0 °F	62.1 °F	87%	30.00 in	2.5 mi	Calm	Calm	N/A	Overcast
6/4/2016	7:52 PM	79.0 °F	61.0 °F	54%	29.92 in	10.0 mi	SSW	4.6 mph	N/A	Clear
	8:52 PM	75.9 °F	61.0 °F	60%	29.93 in	10.0 mi	South	4.6 mph	N/A	Clear
	9:52 PM	73.0 °F	63.0 °F	71%	29.95 in	10.0 mi	SSE	4.6 mph	N/A	Clear
	10:52 PM	69.1 °F	63.0 °F	81%	29.96 in	10.0 mi	Calm	Calm	N/A	Clear
	11:52 PM	68.0 °F	62.1 °F	81%	29.96 in	10.0 mi	SSE	4.6 mph	N/A	Scattered Clouds
	11:59 PM	66.9 °F	62.1 °F	84%	29.96 in	9.0 mi	SSE	3.5 mph	N/A	Mostly Cloudy
	12:52 AM	66.9 °F	62.1 °F	84%	29.95 in	6.0 mi	SE	3.5 mph	N/A	Haze
	1:52 AM	66.0 °F	62.1 °F	87%	29.93 in	5.0 mi	SE	4.6 mph	N/A	Overcast
	2:05 AM	66.0 °F	62.1 °F	87%	29.93 in	4.0 mi	SE	3.5 mph	N/A	Overcast
	2:41 AM	64.9 °F	62.1 °F	90%	29.93 in	2.0 mi	SSE	4.6 mph	N/A	Overcast

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
	2:48 AM	64.4 °F	62.6 °F	94%	29.93 in	1.8 mi	SSE	3.5 mph	N/A	Overcast
	2:52 AM	64.9 °F	62.1 °F	90%	29.92 in	2.0 mi	Variable	3.5 mph	N/A	Overcast
	3:05 AM	64.9 °F	62.1 °F	90%	29.93 in	1.5 mi	SSE	3.5 mph	N/A	Overcast
	3:47 AM	64.4 °F	62.6 °F	94%	29.92 in	2.5 mi	South	4.6 mph	N/A	Overcast
	3:52 AM	64.9 °F	62.1 °F	90%	29.91 in	2.5 mi	SSE	4.6 mph	N/A	Overcast
	4:07 AM	64.0 °F	61.0 °F	90%	29.92 in	1.8 mi	SSE	4.6 mph	N/A	Overcast
	4:17 AM	64.0 °F	61.0 °F	90%	29.92 in	2.0 mi	South	4.6 mph	N/A	Overcast
	4:36 AM	64.0 °F	61.0 °F	90%	29.92 in	1.5 mi	South	3.5 mph	N/A	Overcast
	4:52 AM	64.0 °F	62.1 °F	93%	29.92 in	2.0 mi	Variable	3.5 mph	N/A	Overcast
	5:06 AM	64.0 °F	61.0 °F	90%	29.92 in	3.0 mi	South	4.6 mph	N/A	Overcast
	5:52 AM	64.0 °F	61.0 °F	90%	29.91 in	4.0 mi	Calm	Calm	0.01 in	Light Rain
6/5/2016	7:19 PM	66.9 °F	64.0 °F	90%	29.65 in	2.5 mi	South	9.2 mph	0.00 in	Light Rain
	7:28 PM	66.9 °F	64.0 °F	90%	29.64 in	3.0 mi	SSE	9.2 mph	0.00 in	Overcast
	7:52 PM	68.0 °F	64.9 °F	90%	29.64 in	4.0 mi	South	10.4 mph	0.00 in	Overcast
	8:38 PM	68.0 °F	64.9 °F	90%	29.64 in	2.5 mi	WSW	4.6 mph	0.10 in	Heavy Rain
	8:41 PM	68.0 °F	64.9 °F	90%	29.64 in	1.8 mi	West	3.5 mph	0.15 in	Heavy Rain
	8:52 PM	68.0 °F	64.9 °F	90%	29.65 in	2.0 mi	NNW	10.4 mph	0.22 in	Heavy Rain
	8:58 PM	68.0 °F	64.0 °F	87%	29.64 in	3.0 mi	NNE	8.1 mph	0.03 in	Heavy Rain
	9:09 PM	66.9 °F	63.0 °F	87%	29.60 in	9.0 mi	SE	6.9 mph	0.04 in	Light Rain
	9:39 PM	66.9 °F	64.0 °F	90%	29.62 in	10.0 mi	South	4.6 mph	0.04 in	Light Rain
	9:52 PM	68.0 °F	64.0 °F	87%	29.63 in	10.0 mi	Calm	Calm	0.04 in	Overcast
	10:05 PM	68.0 °F	64.9 °F	90%	29.63 in	10.0 mi	WSW	3.5 mph	N/A	Overcast
	10:32 PM	69.1 °F	64.9 °F	87%	29.62 in	10.0 mi	SSW	4.6 mph	N/A	Overcast
	10:52 PM	68.0 °F	64.0 °F	87%	29.60 in	10.0 mi	SW	3.5 mph	N/A	Overcast
	11:52 PM	68.0 °F	64.0 °F	87%	29.61 in	10.0 mi	WSW	4.6 mph	N/A	Overcast

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
	12:52 AM	68.0 °F	64.0 °F	87%	29.61 in	10.0 mi	WSW	3.5 mph	N/A	Overcast
	1:52 AM	68.0 °F	64.0 °F	87%	29.61 in	10.0 mi	SW	5.8 mph	N/A	Overcast
	2:52 AM	66.9 °F	63.0 °F	87%	29.62 in	10.0 mi	SSW	6.9 mph	N/A	Overcast
	3:20 AM	66.0 °F	63.0 °F	90%	29.62 in	10.0 mi	SW	3.5 mph	N/A	Scattered Clouds
	3:52 AM	64.9 °F	62.1 °F	90%	29.62 in	10.0 mi	Calm	Calm	N/A	Clear
	4:52 AM	64.9 °F	61.0 °F	87%	29.61 in	10.0 mi	SSW	5.8 mph	N/A	Partly Cloudy
	5:52 AM	64.9 °F	61.0 °F	87%	29.61 in	10.0 mi	Calm	Calm	N/A	Clear
6/6/2016	6:52 PM	81.0 °F	55.0 °F	41%	29.61 in	10.0 mi	SW	8.1 mph	N/A	Clear
	7:52 PM	78.1 °F	59.0 °F	52%	29.63 in	10.0 mi	South	9.2 mph	N/A	Clear
	8:52 PM	73.9 °F	59.0 °F	59%	29.64 in	10.0 mi	SSW	6.9 mph	N/A	Clear
	9:52 PM	73.0 °F	59.0 °F	61%	29.65 in	10.0 mi	SSW	8.1 mph	N/A	Clear
	10:52 PM	69.1 °F	60.1 °F	73%	29.65 in	10.0 mi	Calm	Calm	N/A	Clear
	11:52 PM	68.0 °F	59.0 °F	73%	29.64 in	10.0 mi	Calm	Calm	N/A	Clear
	12:52 AM	64.9 °F	59.0 °F	81%	29.63 in	10.0 mi	Calm	Calm	N/A	Clear
	1:52 AM	64.9 °F	60.1 °F	84%	29.62 in	10.0 mi	Calm	Calm	N/A	Scattered Clouds
	2:52 AM	64.0 °F	59.0 °F	84%	29.61 in	10.0 mi	NE	3.5 mph	N/A	Clear
	3:52 AM	63.0 °F	59.0 °F	87%	29.59 in	10.0 mi	Calm	Calm	N/A	Mostly Cloudy
	4:52 AM	63.0 °F	59.0 °F	87%	29.58 in	10.0 mi	Calm	Calm	N/A	Mostly Cloudy
	5:52 AM	63.0 °F	59.0 °F	87%	29.59 in	9.0 mi	Calm	Calm	N/A	Clear
6/7/2016	7:52 PM	75.0 °F	55.0 °F	50%	29.43 in	10.0 mi	NW	11.5 mph	N/A	Scattered Clouds
	8:03 PM	73.9 °F	53.1 °F	48%	29.46 in	10.0 mi	NNW	15.0 mph	N/A	Mostly Cloudy

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
	8:52 PM	64.0 °F	57.9 °F	80%	29.46 in	10.0 mi	SSW	3.5 mph	0.04 in	Partly Cloudy
	9:52 PM	63.0 °F	57.9 °F	84%	29.48 in	10.0 mi	Calm	Calm	N/A	Clear
	10:52 PM	63.0 °F	55.0 °F	75%	29.49 in	10.0 mi	West	4.6 mph	N/A	Partly Cloudy
	11:52 PM	62.1 °F	54.0 °F	75%	29.49 in	10.0 mi	WNW	6.9 mph	N/A	Clear
	12:52 AM	61.0 °F	51.1 °F	70%	29.50 in	10.0 mi	WNW	6.9 mph	N/A	Clear
	1:52 AM	60.1 °F	50.0 °F	69%	29.50 in	10.0 mi	WNW	6.9 mph	N/A	Clear
	2:52 AM	60.1 °F	48.9 °F	67%	29.50 in	10.0 mi	WNW	8.1 mph	N/A	Clear
	3:52 AM	59.0 °F	48.9 °F	69%	29.51 in	10.0 mi	West	6.9 mph	N/A	Clear
	4:52 AM	57.0 °F	48.9 °F	74%	29.53 in	10.0 mi	Variable	3.5 mph	N/A	Clear
	5:52 AM	59.0 °F	48.9 °F	69%	29.55 in	10.0 mi	West	4.6 mph	N/A	Clear
6/8/2016	6:52 PM	64.9 °F	46.0 °F	50%	29.57 in	10.0 mi	NW	8.1 mph	N/A	Clear
	7:52 PM	63.0 °F	43.0 °F	48%	29.61 in	10.0 mi	WNW	17.3 mph	N/A	Mostly Cloudy
	8:52 PM	61.0 °F	41.0 °F	48%	29.64 in	10.0 mi	NW	12.7 mph	N/A	Clear
	9:52 PM	60.1 °F	39.9 °F	47%	29.67 in	10.0 mi	NW	11.5 mph	N/A	Clear
	10:52 PM	57.9 °F	39.0 °F	49%	29.68 in	10.0 mi	NW	9.2 mph	N/A	Clear
	11:52 PM	57.0 °F	39.0 °F	51%	29.68 in	10.0 mi	WNW	6.9 mph	N/A	Clear
	12:52 AM	55.9 °F	39.9 °F	55%	29.69 in	10.0 mi	WNW	12.7 mph	N/A	Clear
	1:52 AM	55.9 °F	39.9 °F	55%	29.69 in	10.0 mi	WNW	10.4 mph	N/A	Partly Cloudy
	2:52 AM	55.9 °F	41.0 °F	57%	29.70 in	10.0 mi	WNW	5.8 mph	N/A	Overcast
	3:52 AM	55.0 °F	41.0 °F	59%	29.70 in	10.0 mi	West	11.5 mph	N/A	Partly Cloudy
	4:52 AM	55.0 °F	41.0 °F	59%	29.70 in	10.0 mi	West	8.1 mph	N/A	Overcast
	5:52 AM	55.9 °F	41.0 °F	57%	29.71 in	10.0 mi	West	6.9 mph	N/A	Mostly Cloudy
6/9/2016	7:52 PM	63.0 °F	35.1 °F	35%	29.78 in	10.0 mi	WNW	10.4 mph	N/A	Clear
	8:52 PM	62.1 °F	36.0 °F	38%	29.81 in	10.0 mi	West	5.8 mph	N/A	Clear

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Precip.	Conditions
	9:52 PM	60.1 °F	36.0 °F	41%	29.82 in	10.0 mi	WNW	8.1 mph	N/A	Clear
	10:52 PM	59.0 °F	37.0 °F	44%	29.83 in	10.0 mi	WNW	5.8 mph	N/A	Clear
	11:52 PM	57.0 °F	37.0 °F	47%	29.84 in	10.0 mi	WSW	3.5 mph	N/A	Clear
	12:52 AM	55.0 °F	37.9 °F	53%	29.84 in	10.0 mi	WSW	4.6 mph	N/A	Clear
	1:52 AM	55.0 °F	37.9 °F	53%	29.84 in	10.0 mi	West	6.9 mph	N/A	Clear
	2:52 AM	54.0 °F	37.0 °F	53%	29.84 in	10.0 mi	WSW	6.9 mph	N/A	Clear
	3:52 AM	53.1 °F	37.9 °F	57%	29.85 in	10.0 mi	West	3.5 mph	N/A	Mostly Cloudy
	4:52 AM	53.1 °F	37.9 °F	57%	29.86 in	10.0 mi	West	5.8 mph	N/A	Scattered Clouds
	5:52 AM	54.0 °F	37.9 °F	55%	29.87 in	10.0 mi	West	6.9 mph	N/A	Mostly Cloudy

APPENDI F-4 – AGENCY CORRESPONDENCE

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

March 8, 2016

Mr. George Logan
REMA Ecological Services, LLC
164 East Center Street, Suite 8
Manchester, CT 06040
Rema8@aol.com

Project: Preliminary Site Assessment for Property Located at 189 Lake Road in Killingly, Connecticut

NDDB Preliminary Assessment No.: 201601996

Dear Amy,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the Preliminary Site Assessment for Property Located at 189 Lake Road in Killingly, Connecticut.

According to our records there are known extant populations of State Listed Species known that occur within or close to the boundaries of this property. I have attached a list of these species to this letter. Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the proposed project. This preliminary assessment letter cannot be used or submitted with your permit applications at DEEP. This letter is valid for one year.

To prevent impacts to State-listed species, field surveys of the site should be performed by a qualified biologist when these target species are identifiable. A report summarizing the results of such surveys should include:

1. Survey date(s) and duration
2. Site descriptions and photographs
3. List of component vascular plant and animal species within the survey area (including scientific binomials)
4. Data regarding population numbers and/or area occupied by State-listed species

5. Detailed maps of the area surveyed including the survey route and locations of State-listed species
6. Statement/résumé indicating the biologist's qualifications

The site surveys report should be sent to our CT DEEP-NDDB Program (deep.nddbrequest@ct.gov) for further review by our program biologists along with an updated request for another NDDB review.

If you do not intend to do site surveys to determine the presence or absence of state-listed species, please let us know how you will protect the state-listed species from being impacted by this project.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.
Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

Species List for NDDB Request

Scientific Name	Common Name	State Status
Invertebrate Animal		
Acronicta fragilis	Fragile dagger moth	SC
Callophrys irus	Frosted elfin	T
Derrima stellata	Pink star moth	SC
Terrestrial Community - Other Classification		
Floodplain forest	<null>	<null>
Vertebrate Animal		
Glyptemys insculpta	Wood turtle	SC
Lasiurus borealis	Red bat	SC
Terrapene carolina carolina	Eastern box turtle	SC

E = Endangered, T = Threatened, SC = Special Concern, * Extirpated

Connecticut Department of
Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division

CPPU USE ONLY
App #:_____
Doc #:_____
Check #: No fee required
Program: Natural Diversity Database Endangered Species
Hardcopy _____ **Electronic** _____

Request for Natural Diversity Data Base (NDDB) State Listed Species Review

Please complete this form in accordance with the instructions (DEEP-INST-007) to ensure proper handling of your request.
There are no fees associated with NDDB Reviews.

Part I: Preliminary Screening & Request Type

Before submitting this request, you must review the most current Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the DEEP website. These maps are updated twice a year, usually in June and December.

Does your site, including all affected areas, fall in an NDDB Area according to the map instructions:

☒ Yes ☐ No **Enter the date** of the map reviewed for pre-screening: **September 2015**

This form is being submitted for a :	
☒ *New* NDDB request ☐ *Renewal/Extension* of an existing NDDB Request ☐ With modifications ☐ Without modifications* *no attachments required [*CPPU Use Only - NDDB-Listed Species Determination* # 1736]	☐ *New* **Safe Harbor Determination** associated with an application for GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities ☐ *Renewal/Extension* of an existing Safe Harbor Determination ☐ With modifications ☐ Without modifications* *no attachments required [*CPPU Use Only - NDDB-Safe Harbor Determination* # 1736]
Enter NDDB Determination Number for Renewal/Extension:	Enter Safe Harbor Determination Number for Renewal/Extension:

Part II: Requester Information

***If the requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, the name shall be stated *exactly* as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of the State's database CONCORD.* (www.concord-sots.ct.gov/CONCORD/index.jsp)

If the requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the Request to Change company/Individual Information to the address indicated on the form.

1. Requester Name*: **REMA Ecological Services, LLC**

Address: **164 E. Center Street, Suite 8**

City/Town: **Manchester** State: **CT** Zip Code: **06040**

Business Phone: **860 649 7362** ext.

Contact Name: **George T. Logan, MS, PWS, CSE**

E-mail: **rema8@aol.com**

By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes

a) Requester can best be described as:

☐ Individual ☐ Federal Agency ☐ State agency ☐ Municipality ☐ Tribal

☒ *business entity (* if a business entity complete i through iii):

i) Check type ☐ corporation ☒ limited liability company ☐ limited partnership ☐ limited liability partnership ☐ statutory trust ☐ Other:

ii) Provide Secretary of the State Business ID #: 0539455 This information can be accessed at the Secretary of the State's database (CONCORD). (www.concord-sots.ct.gov/CONCORD/index.jsp)

iii) ☐ Check here if your business is **NOT** registered with the Secretary of State's office.

b) Acting as (Affiliation), pick one:

☐ Property owner ☒ Consultant ☐ Engineer ☐ Facility owner ☐ Applicant

☐ Biologist ☐ Pesticide Applicator ☐ Other representative:

2. List Primary Contact to receive Natural Diversity Data Base correspondence and inquiries, if different from requester.

Company:

Contact Person: Title:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

*E-mail:

*By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes.

Part III: Site Information

This request can only be completed for one site. A separate request must be filed for each additional site.

1. SITE NAME AND LOCATION

Site Name or Project Name: **189 Lake Road**

Town(s): **Killingly**

Street Address or Location Description:
189 Lake Road

Size in acres, or site dimensions: **~45.0**

Latitude and longitude of the center of the site in decimal degrees (e.g., 41.23456 -71.68574):

Latitude: **41.8636** Longitude: **-71.9154**

Method of coordinate determination (check one):

☐ GPS ☐ Photo interpolation using CTECO map viewer ☒ Other (specify): **NWI Mapper**

2a. Describe the current land use and land cover of the site.

Mostly forested, including white pine dominated, pole-sized evergreen/deciduous, shrub/sapling thickets, open hayfield, forested wetlands, man-made pond, residential lawn.

b. Check all that apply and enter the size in acres or % of area in the space after each checked category.

☐ Industrial/Commercial _____ ☐ Residential 0.5 ☒ Forest 80

☒ Wetland 17 ☐ Field/grassland 2.5 ☐ Agricultural ____

☐ Water _____ ☐ Utility Right-of-way _____

☐ Transportation Right-of-way _____ ☐ Other (specify): _____

Part IV: Project Information

1. PROJECT TYPE:

Choose Project Type: Site assessment , If other describe: _____

2. Is the subject activity limited to the maintenance, repair, or improvement of an existing structure within the existing footprint? ☐ Yes ☒ No If yes, explain.

Part IV: Project Information (continued)

3. Give a detailed description of the activity which is the subject of this request and describe the methods and equipment that will be used.

   This request is for planning purposes only.

4. If this is a renewal or extension of an existing NDDB or Safe Harbor request *with* modifications, explain what about the project has changed.

5. Provide a contact for questions about the project details if different from Part II primary contact.

   Name:

   Phone:

   E-mail:

Part V: Request Requirements and Associated Application Types

Check *one* box from either Group 1, Group 2 *or* Group 3, indicating the appropriate category for this request.

Group 1. If you check one of these boxes, fill out Parts I – VII of this form and submit the required attachments A and B.

- ☐ Preliminary screening was negative but an NDDB review is still requested
- ☐ Request regards a municipally regulated or unregulated activity (no state permit/certificate needed)
- ☒ Request regards a preliminary site assessment or project feasibility study
- ☐ Request relates to land acquisition or protection
- ☐ Request is associated with a *renewal* of an existing permit, with no modifications

Group 2. If you check one of these boxes, fill out Parts I – VII of this form and submit required attachments A, B, *and* C.

- ☐ Request is associated with a *new* state or federal permit application
- ☐ Request is associated with modification of an existing permit
- ☐ Request is associated with a permit enforcement action
- ☐ Request regards site management or planning, requiring detailed species recommendations
- ☐ Request regards a state funded project, state agency activity, or CEPA request

☐ **Group 3.** If you are requesting a **Safe Harbor Determination**, complete Parts I-VII and submit required attachments A, B, and D. Safe Harbor determinations can only be requested if you are applying for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

If you are filing this request as part of a state or federal permit application(s) enter the application information below.

Permitting Agency and Application Name(s): _____

State DEEP Application Number(s), if known: _____

State DEEP Enforcement Action Number, if known: _____

State DEEP Permit Analyst(s)/Engineer(s), if known: _____

Part VI: Supporting Documents

Check each attachment submitted as verification that *all* applicable attachments have been supplied with this request form. Label each attachment as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name, site name and the date. **Please note that Attachments A and B are required for all new requests and renewals/extensions with modifications.** Renewals/Extensions with no modifications do not need to submit any attachments. Attachments C and D are supplied at the end of this form.

☒ Attachment A:	**Overview Map:** an 8 1/2" X 11" print/copy of the relevant portion of a USGS Topographic Quadrangle Map clearly indicating the exact location of the site.
☒ Attachment B:	**Detailed Site Map:** fine scaled map showing site boundary details on aerial imagery with relevant landmarks labeled. (Site boundaries in GIS [ESRI ArcView shapefile, in NAD83, State Plane, feet] format can be substituted for detailed maps, see instruction document)
☐ Attachment C:	**Supplemental Information, Group 2 requirement (attached, DEEP-APP-007C)** ☐ Section i: Supplemental Site Information and supporting documents ☐ Section ii: Supplemental Project Information and supporting documents
☐ Attachment D:	**Safe Harbor Report Requirements, Group 3 (attached, DEEP-APP-007D)**

Part VII: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."

Signature of Requester (a typed name will substitute for a handwritten signature)	**2/9/16** Date
George T. Logan, MS, PWS, CSE Name of Requester (print or type)	**Principal Environ. Scientist** Title (if applicable)
Signature of Preparer (if different than above)	Date
Name of Preparer (print or type)	Title (if applicable)

Note: Please submit the completed Request Form and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

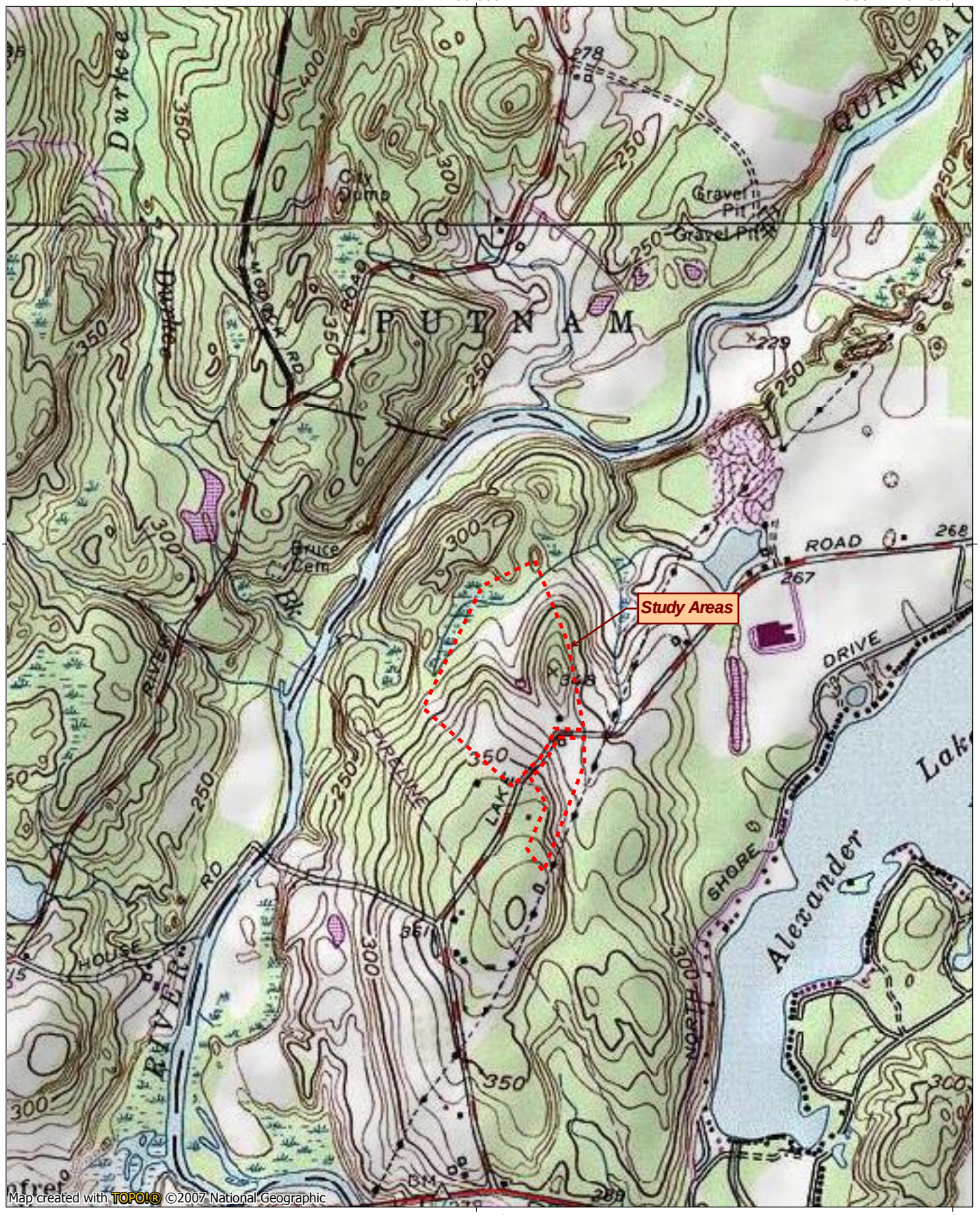
Or email request to: **deep.nddbrequest@ct.gov**

Figure 1: Site Locus; 189 Lake Road, Killingly, CT

71°55.000' W

WGS84 71°54.000' W

41°52.000' N



41°52.000' N

71°55.000' W

WGS84 71°54.000' W

NATIONAL GEOGRAPHIC

0.0 0.1 0.2 0.3 0.4 0.5 miles

0.0 0.5 km

MN TN

14°

02/05/16

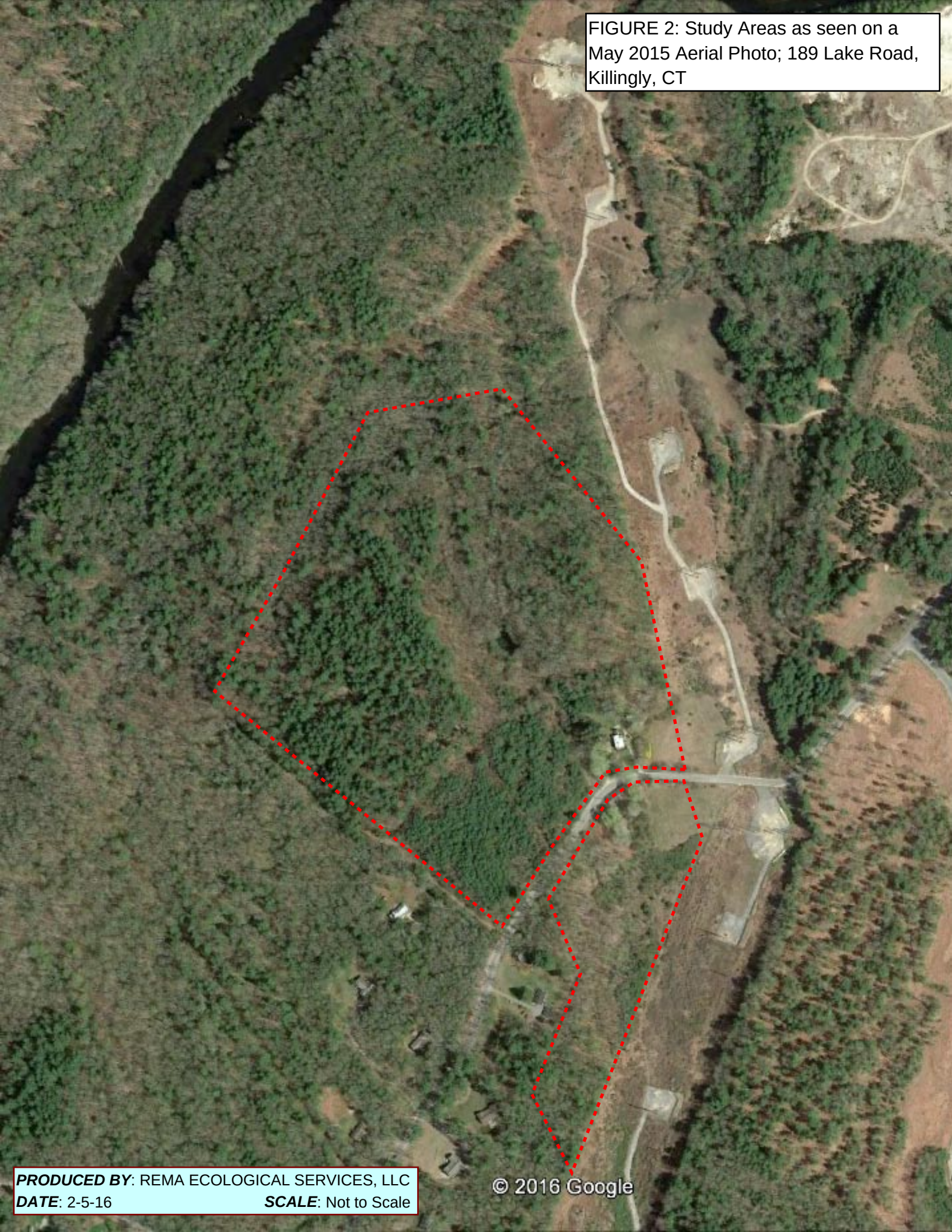


FIGURE 2: Study Areas as seen on a May 2015 Aerial Photo; 189 Lake Road, Killingly, CT

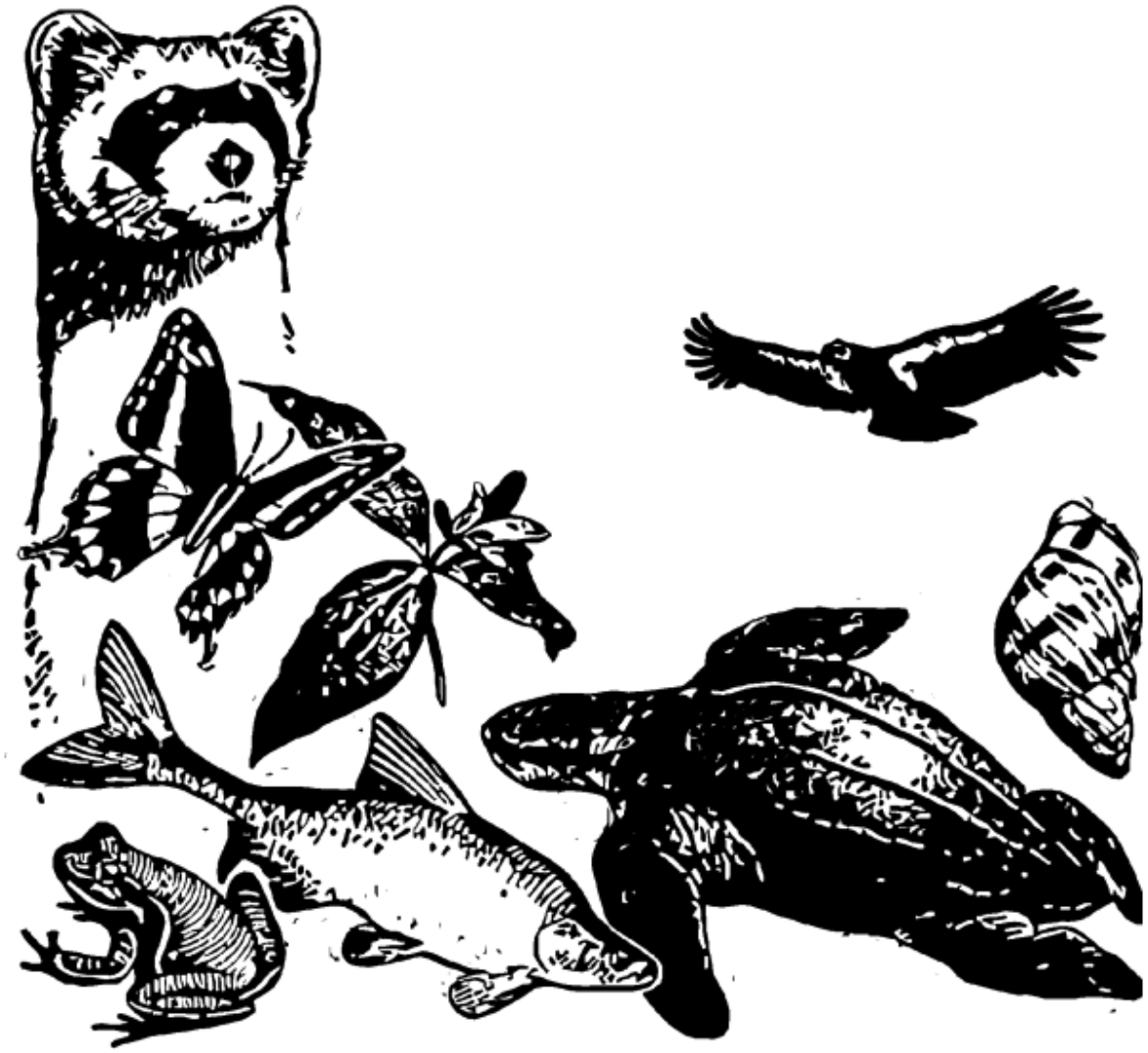
PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 2-5-16 ***SCALE***: Not to Scale

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

Generated May 10, 2016 09:41 AM MDT, IPaC v3.0.7

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

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IPaC Trust Resources Report 1
Project Description 1
Endangered Species 2
Migratory Birds 3
Refuges & Hatcheries 5
Wetlands 6

U.S. Fish & Wildlife Service

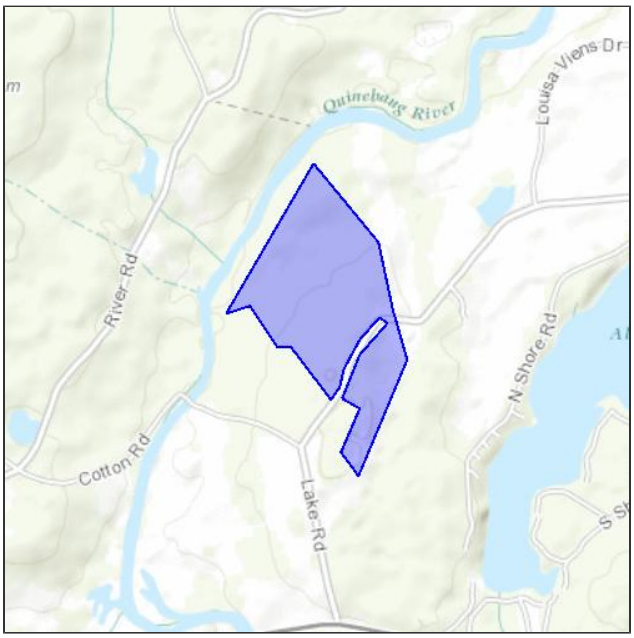
IPaC Trust Resources Report

LOCATION

Windham County, Connecticut

IPAC LINK

https://ecos.fws.gov/ipac/project/OTWS5-YUVNN-DNHGV-OJWL4-GC2OM4



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Mammals

Northern Long-eared Bat Myotis septentrionalis — Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.birdscanada.org/birdmon/default/datasummaries.jsp

The following species of migratory birds could potentially be affected by activities in this location:

American Oystercatcher Haematopus palliatus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
Season: Breeding

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Least Bittern Ixobrychus exilis
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC

Willow Flycatcher Empidonax traillii — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
Season: Breeding

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.